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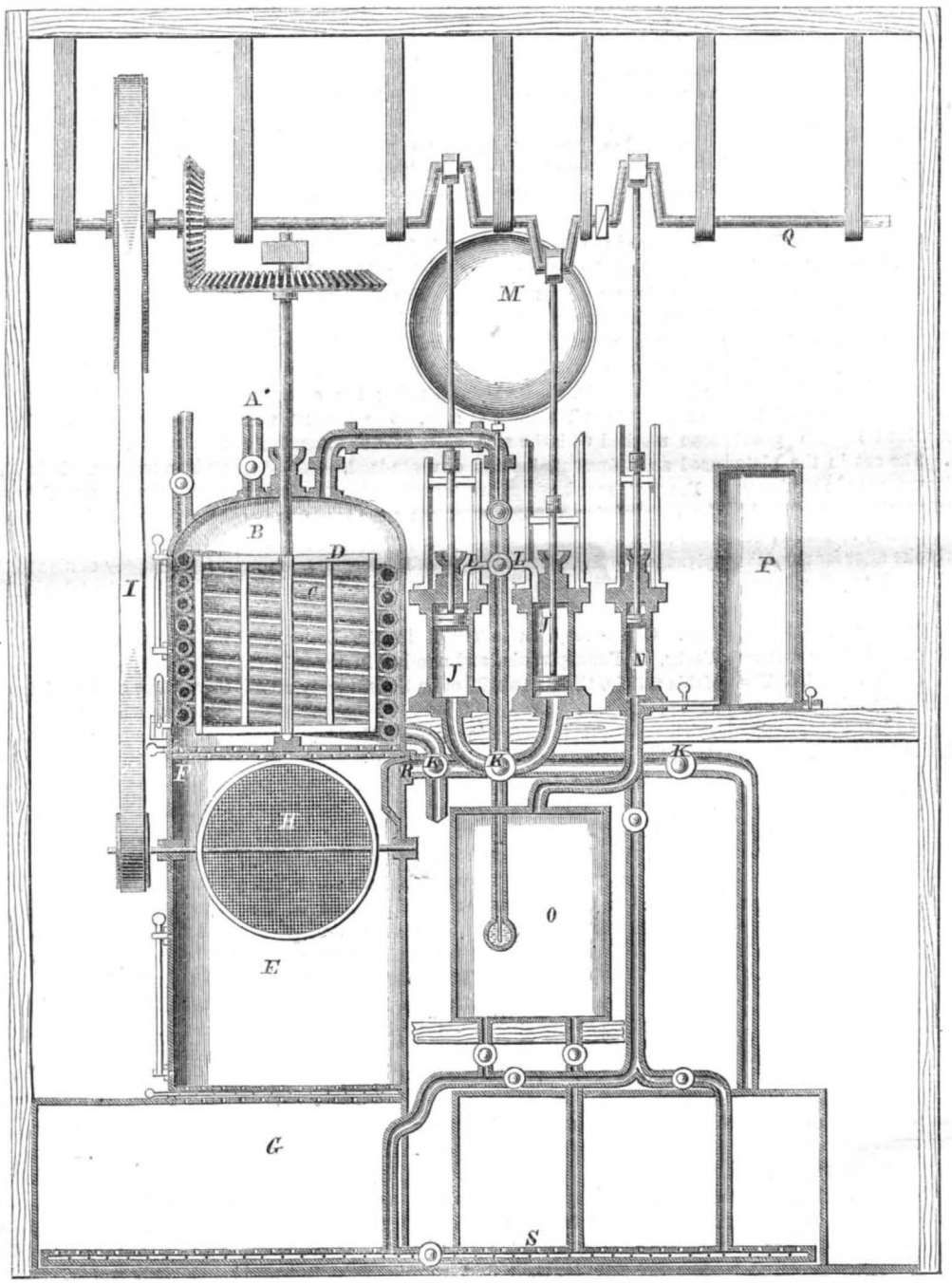
## New System of Deodorizing Petroleum.

This engraving represents an improved apparatus for deodorizing petroleum oil.

By this process the distilled petroleum is deodorized or "treated" by merely removing the pressure of the atmosphere and agitating the oil. In this manner the odor is set free in the form of a gas, and a very superior article of oil is produced; some samples might almost be mistaken for olive oil, it is so free from the peculiar petroleum odor. Naphtha is also readily deodorized so that it is not at all objectionable. The fire test, by this process, is raised so high that all of the naphtha produced can be worked or mixed in with the oil, and the point of ignition is still above 110°, or above that of the oil as now treated by chemicals. In the ordinary process the cost for chemicals is about five cents per gallon, in this process the cost is the coal used for supplying power. The importance of an economizing process of this kind may be seen when the petroleum yield is considered—10,000 bbls. per day.

The following is a description of the mode of operating this machine:—

The oil is passed through pipes, B, into the receiver, B, which is exhausted of air. C is a tubular coil lying in the oil in the receiver, A, through which steam is introduced for the purpose of heating the oil. D is an agitator, by means of which the oil is agitated and thus equally heated. E is the lower compartment of the receiver, which is also exhausted of air; into this the oil is introduced by means of the register, F, and passed into the tank, G. H is an agitator, made of wire cloth or its equivalent, driven at a high velocity by the belt, I. Its office is to separate the oil and so liberate the gases confined in it. J J are two exhaust pumps by which the gases, as they pass from the oil, are drawn through the tubes, K, from the receivers, B and E, and discharged through the pipes, L, into the balloon, M. N is a condensing pump by which air or gases are condensed in the receiver, O, in connection with the tanks, G S. P is a receiver for generating gases. Q is a shaft by which the machinery is driven. R R are stop-cocks and S is one of many perforated tubes through which the condensed air or gas is passed into the tanks, G G.




GREEN'S SYSTEM OF DEODORIZING PETROLEUM.

The operation is easily understood from these details. There are no chemicals used in the process, the end being attained by purely mechanical devices. We also append a report of Prof. Doremus in connection with this subject:—

Col. Chas. B. Norton:—In compliance with your request, that I should give a general statement of the result of Mr. Joel Green's experiments, as performed in my laboratory, on kerosene oil, prior to a more detailed and exact report of the process, I beg leave to submit the following:—

Two samples of unpurified kerosene were separately treated. They were of specific gravity 45° Baume, and 62° Fah.; one was from Messrs. Hendricks & Somers's establishment, the other from that of Messrs. Stebbins & Co. After being warmed to 135° Fah., in a vessel surrounded with water at the same temperature, they were placed on the plate of an air pump, covered with a glass jar, and relieved of atmospheric pressure sufficiently to raise and maintain the mercurial column between 28 and 29 inches.

Rapid ebullition soon commenced, and by rotating an axis with flanges in the midst of the oil, a gentle agitation was excited that facilitated the discharge of the more volatile vapors. After continuing this treatment for thirty minutes the kerosene was removed from the exhausted receiver. In consequence of the warm-water jacket it had only cooled to 100° Fah. It was thoroughly washed with cold water for five minutes by means of a little mechanism known as an "egg-beater."

These three operations—heating the oil from 130° to 140° Fah., distilling for half an hour in vacuo with agitation, and thorough washing with cold water—benefitted the liquid in three ways—first, it removed the pungent and unpleasant odor so characteristic of the unpurified kerosene, and found even in that which has been chemically treated—this improvement was palpable even prior to the washing with water and while the water was warm; second, it increased the specific gravity from 1° to 2° Baume; third, it produced a marked change in the fire test, as commonly employed, raising the temperature at which the combustible vapors first fired from 15° to 27° above that of the oil untreated.

Both of the samples of kerosene referred to were subjected to the same operations and with the same important results. An experiment similar to that described was also made on the crude petroleum, accomplishing the same three desiderata, viz., removing much of the disagreeable odor, raising its specific gravity, and diminishing its combustibility.

R. Ogden Doremus,
Professor of Chemistry at the Free Academy and at the Bellevue Medical College.

New York, Oct. 9, 1865.

This invention was patented through the Scientific American Patent Agency on March 14, 1865, by Joel Green. Address A. D. Mellick, No. 26 Pine street, New York, for further information.

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It is said the Willimantic Linen Co. made over 300 per cent profit last year.

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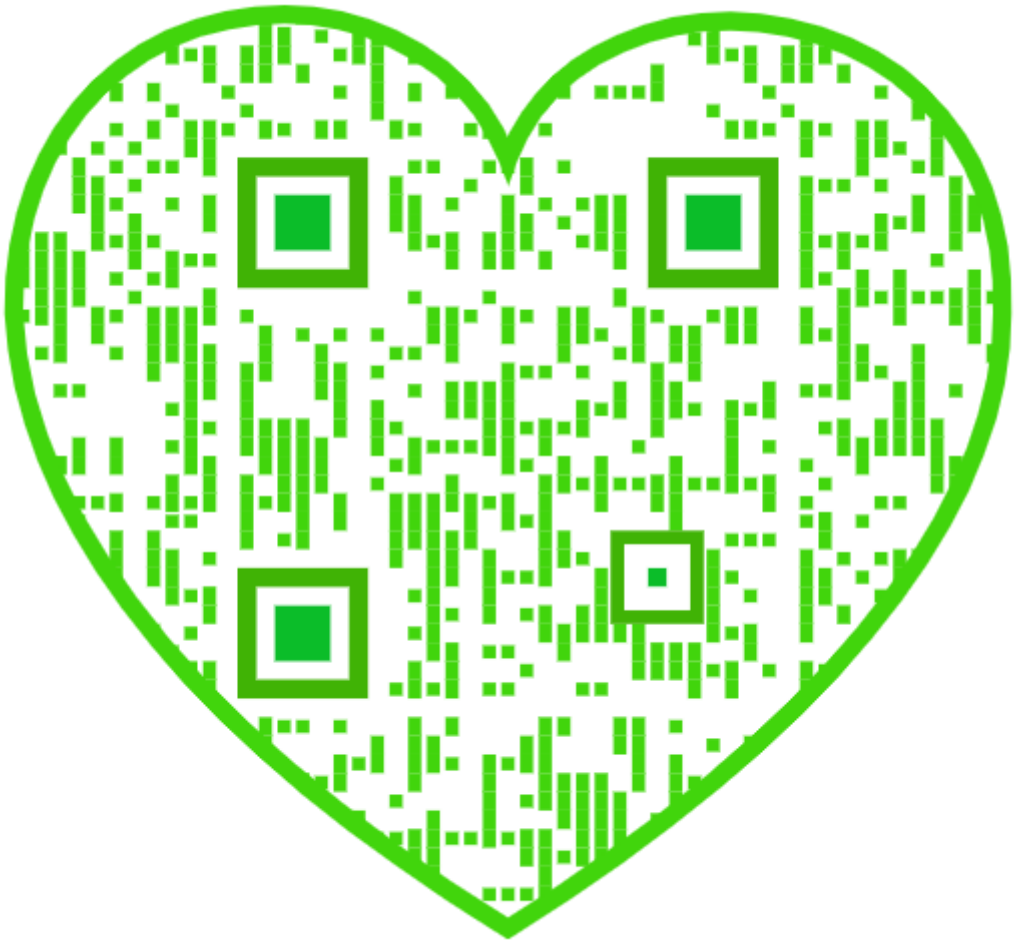

## POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

The Association held its regular weekly meeting at its room at the Cooper Institute, on Thursday evening Nov. 30, 1865, the President, Prof. S. D. Tillman, in the chair.

### RARE MINERALS ON THIS ISLAND.

Mr. Chipman exhibited a quantity of sulphate of soda in a phial, and said that he found it as an efflorescence on the rocks which were cut through in grading First avenue, near Forty-second street, in this city.

Dr. Feuchtwanger said that this was the second discovery by Mr. Chipman of rare minerals in the rocks of New York City. Near Forty-seventh street he had found alum—the sulphate of alumina—at the junction of a mass of feldspar above and gneiss below. There had been considerable speculation in regard to the formation of this alum; the most probable theory is that the sulphur came from the decomposition of pyrites, and the alumina from the decomposition of feldspar.

The President remarked that sulphate of alumina is not alum—alum being a double sulphate of alumina and some other metallic oxide.

### BOILER EXPLOSIONS.

Mr. Fisher read a paper giving a sketch of some of those theories of boiler explosions which have been fully set forth and disposed of in the columns of the SCIENTIFIC AMERICAN. The paper urged a more respectful consideration of these theories.

Capt. R. G. McDougall, being invited by the President to give an account of the *St. John* boiler explosion, remarked that he had been constantly engaged in using and constructing boilers and boiler plate for the last twenty-two years, and had examined a number of exploded boilers; he was tired of the stereotyped verdicts, "Nobody to blame." He then described the boiler of the *St. John*, saying that he examined it with great care soon after the explosion. The cut in the plate that gave way, made by carelessness of the workman in chipping off the edge of the overlapping plate, he could see across the deck, which is fifty feet wide. He then explained why this plate broke after four months use at 28 lbs. pressure, when it had previously sustained the hydraulic pressure of about 50 lbs. The plate was not on the cylindrical part of the boiler, but on the outside of the fire box, and there was an area of $4\frac{1}{2} \times 5\frac{1}{2}$ feet, which was not stayed. The boilers of the *Dean Richmond* have in this same portion and in the same area, thirty-six stay rods passing through the boiler from one side to the other. When the *St. John* boiler was subjected to the hydraulic test, this plate was bulged outward, returning to its previous form when the pressure was removed; at every change of pressure this bending was repeated, and, of course, the principal bend was along the line of the cut; thus the plate was finally broken. When boilers are properly made and properly managed they will not explode. In every case of boiler explosion there is somebody to blame.

Dr. Bradley observed that at about the time of the *St. John* explosion, in which one plate of the boiler only gave way, there was another of a very different character near Fortress Monroe. A steam tug blew up, and she was blown to atoms, not a single one of her crew being left to tell the tale. It seemed to the speaker that in such cases there must be some detonating gases formed in the boiler—something different from steam, to produce such results.

Mr. J. Wyatt Reid remarked that he is a boiler maker, and he agreed with Capt. McDougall, that whenever a boiler explodes it is from faulty construction or bad management. As a possible explanation of the tug-boat case, he would mention a circumstance that occurred in a small steamboat running on the south side of the Island of Cuba. The engineer opened the valve to blow out the salt, and forgot to close it; the water got very low in the boiler, and as the fires were burning brightly the boiler became very hot. When the engineer went down from the deck, he saw tongues of blue steam issuing from the boiler at all the joints. He immediately tried the gage cocks, and found no water. One of the firemen, observing this, started for the feed pump, to throw in water, when the engineer knocked him down with a hammer, and calling to the other fireman to draw the fires, went himself and did what many engineers would not have done—he sat down on the safety valve. He knew that if the safety valve had opened in the least, the small quantity of water in the boiler would have been dashed in spray all over the hot surfaces, and suddenly converted into steam, doubtless blowing the boat to pieces.

Dr. Bradley inquired what is the objection to the theory, so generally received a few years ago, that in these very disastrous explosions the water has been decomposed, and a mixture of explosive gases formed?

The President replied, that there is nothing in any of the mysterious theories of boiler explosions. These disasters are always the result of defective construction or improper management. It was well to have this theory of explosive gases disposed of. Water is composed of oxygen and hydrogen, and they can be separated only by bringing them in contact with something which has a stronger attraction for one of the elements than they have for each other. Red-hot iron will take the oxygen from water and leave the hydrogen, but the hydrogen can be burned only by bringing it in contact with free oxygen, and there is none in a steam boiler. Furthermore, the quantity of water decomposed is too small to produce an explosion, even if air was supplied.

## Zinc Manufacture in Illinois.

The existence of rich zinc ores in various parts of the country has long been known, and numerous attempts have been made to turn them to account. As far back as the Revolution we find these experiments beginning to be made and continuing till some twelve years since without success. The first remunerative results were realized in New Jersey by converting the zinc ore known as Franklinite into the white oxide of zinc for paint. Similar works were erected in Pennsylvania, at Bethlehem, using the calamine or carbonate and silicate of zinc. The market was soon stocked with the zinc white now so extensively used as a pigment, instead of white lead.

Practical men having thus turned their attention to the ores of zinc, several attempts were made to reduce them to a metallic state, in New Jersey, Pennsylvania, and Wisconsin. These attempts were generally failures, and the belief was confirmed that metallic zinc could not be successfully manufactured here. One exception is found in the Bethlehem Works, of Pennsylvania, and another in the subject of this article, the zinc works of La Salle, ninety miles west of Chicago.

The country is indebted to Messrs. Mathieson and Hegehler, two highly intelligent Germans, and graduates of the Mining Academy of Freiburg, for the first success in this direction. These gentlemen came to America in 1857, and began their experiments at the Lehigh Zinc Works, in Pennsylvania, where they produced, as it is believed, the first metallic zinc of American make. Learning of the superior richness of the Wisconsin ores, they went West in 1858, and examined the zinc ores of the lead region, which had been described in the geological reports of Wisconsin in 1853. Satisfied of their value and abundance, they looked for fuel and facilities of manufacture and transportation. La Salle, with its rich deposits of coal, building material, and unequaled means of land and water transportation, presented these conditions in the highest degree, and they at once decided to make it the location of their works. At first they rented a small temporary furnace, and, in a quiet and unpretending way, began experiments upon the ores, coal, and fire-clays within their reach.

The fire-clay for their first retorts was brought from Germany, all American fire-clays then known failing to stand the intense heat required. Great difficulty also was experienced in adjusting the old machinery and processes of Europe to the new materials. For nearly five years these men labored with a patience worthy of all praise, overcoming one obstacle after another by a rare combination of scientific knowledge and practical skill. So numerous have been their changes in the old methods of treating the ores of zinc, that they may justly claim to be the inventors as well as builders of their present furnaces. They have at last achieved a most triumphant success. Their new works are being constructed in the most permanent manner, and, when completed, will be the most extensive and perfect in the world. They consist first, of a powerful mill, in which the ore and fine clay are ground; second, of an extensive pottery, in which the retorts, pipes, and fire brick used in constructing the furnaces are made; third, of the reducing furnaces, each capable of holding 160 retorts. The materials used in building are brick and stone, the latter being obtained from a fine quarry on the grounds of the company. The works are situated about one mile north of La Salle, near the line of the Central Railroad, and opposite the Kentucky coal mine, from which they obtain their coal.

The reducing furnaces are large square structures built up of fire-brick, with a frame-work of iron bars on either side to sustain the retorts. These retorts are from three to five feet in length, and vary in size and shape, from round to oval, and from six inches to one foot in diameter. They are placed horizontally in rows, one above the other, slightly inclining forward to facilitate the separation of the zinc. The ore, after being roasted at the mine, ground, mixed with fine coal, and moistened with water, is placed in the retorts by means of a semi-cylindrical shovel. Conical earthen pipes are inserted into the open ends of the retorts and luted in with fire-clay. The fires below are then increased until a white heat pervades the interior of the furnace. At first the openings in the tubes emit light blue flames, caused by the carbonic acid evolved; later, the flames become whiter, with tints of green, and of great brilliancy, forming at night a pyrotechnical display of wonderful beauty. Sheet-iron tubes fitting the pipes, furnished with handles and closed at one end, are then applied to catch the oxide of zinc or "blue powder," which begins to escape with the flame. These are taken off at short intervals, and the blue powder removed to be mixed with the ore and returned to the retorts again. When the zinc is ready to draw, a large iron ladle is held under the beak of each retort, and the molten zinc is drawn out with an iron scraper. It is then poured into molds which give it the form of flat rectangular ingots, weighing 25 lbs. each. The tubes are then applied again, the firing continued, and after two or three hours more a fresh supply of zinc is obtained. These operations are continued all day and night, when the retorts are cleaned out and refiled. In this way a change is worked off every 24 hours.

The daily yield of the three furnaces is about four tuns. The coal used is mostly slack or waste of the mines, of which about six tuns are required to produce a tun of zinc. The amount of ore consumed is about five tuns, or 2,400 pounds to each tun of metal produced. The zinc made here is said to be the best in the world. Telegraph zincs are already extensively manufactured for Western consumption.

The ore used is obtained from the iron region of Wisconsin, 100 miles north of La Salle. It is found in great quantities among the rubbish of the old lead mines, where it has been thrown aside by the miners under the name of "dry bone." It often attends the lead ore as the matrix, or vein stone, and is in bad repute from the tendency of such veins to give out. The miners say the dry bone eats out the galena. The ore resembles a dirty limestone, and, in its natural state, gives no indication of the brilliant metal which it holds. Heavy deposits of it have been opened in mining for lead, but the surface supply is adequate for present purposes.

The ore is roasted at the mines, and parts with carbonic acid and water, which form 33 per cent of its weight. It is then put on the cars and transported to La Salle—the Illinois Central Railroad, with commendable liberality, charging only a nominal price for transportation—to encourage the development of the manufacture. The price of zinc in the pig is now about $200 per tun. The product of the La Salle furnaces is mostly sold in New York, where it is rolled and manufactured. The proprietors intend erecting rolling mills next season for the manufacture of sheet zinc. One of them is now in Germany securing the means and skilled labor for a still further expansion of the enterprise.—*Hunt's Merchants' Magazine.*

[This process is a modification of that employed at the Vielle Montagne Works, in Belgium Our chemical readers will remark that the light blue flames are carbonic oxide burning to carbonic acid. —EDS. SCI. AM.

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### Breeding In and In.

The question of breeding in and in has for years been one of much discussion in stock growing, and not less in its application to the human family, so far as it relates to the intermarriage of first cousins. Almost every annual report coming from the benevolent institutions has called public attention to the defects in sight, hearing, or mind of the inmates of these institutions as exhibited in so many persons who were the children of first cousins. Many of these reports have called upon the State Legislatures to lessen defects of this nature by prohibiting such marriages.

Under this state of discussion we suppose that a portion of Mr. Klippart's letter to the Commisioner of Agriculture, published in our last report, will receive marked notice. The part we refer to is where he speaks of Mr. Steiger's flock of sheep. He says:—

"I was led to visit his estate on account of the sheep, because I had heard of it every where as being the most famous stock flock in all Saxony, if not in all Germany. The flock was founded in 1806, by the purchase of the most celebrated ewes from the stock flock of the Prince of Reuss, at Klipphausen, and the flock of the latter traces back to an importation from Spain of the most celebrated flocks there. The present flock at Leutewitz has been bred in and in for about sixty years, and has had no infusion or admixture of any other blood. Some of the bucks which I saw weighed, with one year's fleece on, one hundred and fifty pounds, and were almost as large as some of the Rambouillets I saw at Stettin. They were finely built animals, and had splendid compact heads. The bucks' fleeces unwashed weighed from twelve to twenty pounds, and, when washed, from six to ten pounds; the ewes' fleeces, unwashed, seven to ten pounds, and, when washed, from four to six pounds. The wool is used in the manufacture of the finest cloths, etc."

We understand that there is now preparing in the Department of War a work or works on the social statistics, drawn from an examination of about two millions of men, who came under examination as to their physical qualities during the recent civil war. One fact developed will be, particularly as found to exist in one of our most northern States, the large number of defective physical organizations arising from this breeding in and in through the marriage of first cousins.

The following statement we find in one of our foreign papers, and the reasons there assigned for the facts given show the cause of the difference of opinion which has so long prevailed as to the results of such breeding; some maintaining that no ill consequences are necessarily and inseparably connected with it, and others the reverse.

A French statistician, in prosecuting his examination of this matter, selected forty-six cases of consanguineous marriages among the Jews in the town of Batz, in the French department of the Loire Inferieure:—

He examined the husbands, wives, and children, both in regard to their physical and intellectual development, and made inquiries concerning the families examined and their ancestors through the mayor, pastor, and oldest inhabitants. Combining the statistics thus collected, he has found that intermarriages do not bring about disease, idiocy, or malformation. However, it is important to mark that these results are attributed by the writer to the favorable climate of the locality, and to the general habits, hygeine, and morality of the inhabitants, as well as to the absence of all hereditary disease. The town of Batz is situated upon a peninsula, bounded on one side by the rocks of the sea shore, and on the other by salt marshes. The air is pure, and the most frequent winds are from the north, northeast, and northwest. The number of inhabitants is about 3,300. They have little communication with other parts of the country, and their occupation is almost confined to the preparation of salt. They are very intelligent, almost all the adults being able to read. The morality is of high stamp, prostitution being unknown. Theft and murder have not occurred within the recollection of the oldest inhabitant. Mothers nurse their children till they are fifteen months old, and the general food of the population it of the vegetable class. There are at present in Batz forty-six consanguineous pairs of first cousins, five unions between second cousins, thirty-one marriages of third cousins, and ten of cousins in the fourth degree. From the five unions of second cousins there have been twenty-three children, none of whom have presented any congenital deformity. Thirty-one marriages of third cousins have produced one hundred and twenty children, all healthy; and the marriages of fourth cousins have given rise to twenty-nine childern, all of whom, with the exception of those who died of ague, were strong and healthy at the period of examination. The writer contends that such facts as the foregoing prove that such sanguineous marriages by no means lead to the degeneration of the race.

It will be seen that this report of the French statistician, and the statements made by Mr. Klippart, go to show that breeding in and in of itself results in no evil. But the conditions of this result must be always kept in view. They are, freedom from disease, and of the tendency to inheritable diseases. Animals and mankind, one in flocks or herds, and the other in families, have been swept away, when the breeding has not been in and in, where both parents have been subject to the same disease. Thus, where both parents have inherited that scrofulous taint which ends in consumption, all the children have perished from it, although the parents had no consanguineous relation to each other. Mere consanguinity, therefore, is not the point to be regarded. Like begets like. The inheritable quality of the blood is the thing. If a family has an inheritable disease, then that disease, being in both parents, will increase in a geometrical proportion, and soon result in the destruction of the offspring. But if one parent is healthy, then that health may acquire such an ascendency over the disease of the unhealthy parent, by reason of its greater vitality, as will not only sustain the average health of the offspring, but may ultimately overcome the tendency to disease which the diseased parent transmits to the blood of the offspring.

The conditions of breeding in and in, then, are safe only when there is perfect health in the whole family, and when the external circumstances, as proper food, exercise, location, etc., all favor a continuation of such health. Where there are physical defects of form or health it is a fatal mode of breeding, for the degeneracy will be doubled in the offspring. It will be 2, 4, 8, 16, and so on, quickly resulting in extermination.

Eminent breeders, having no flocks or herds equal to their own from which to obtain crosses, have been sometimes forced to resort to in and in breeding, but the dangers of it have generally led them to abandon it when they safely could do so.—*Report of Agricultural Department,*

### Aluminum and Aluminum Bronze.

M. Ernest Saint Edme has recently investigated some of the chemical relations of aluminum. His method consisted in connecting a wire of aluminum with one of the poles of a galvanometer and a wire of some other metal with the other pole, plunging the two wires into some exciting fluid, and then noting the direction and amount of the deviation of the needle. He finds that, with hydrochloric acid as the exciting liquid, aluminum is negative to both zinc and lead—a result which chemists would scarcely have expected, considering how powerfully, when by itself, aluminum is acted upon by hydrochloric acid. With an aqueous solution of caustic potash as the exciting agent the result is just the reverse, aluminum being positive to both zinc and lead under the influence of that excitant, as it is also under the action of an aqueous solution of ammonia. Aluminum, when alone, is scarcely attacked at all by sulphuric acid diluted until it will dissolve zinc, but when the aluminum is associated with either gold, copper, or platinum it is at once acted upon by this agent, though only feebly. When associated with either zinc or iron, however, aluminum, with dilute sulphuric acid for the excitant, is very strongly negative. The only other liquid M. Saint Edme employed in these experiments is nitric acid. Nitric acid does not act in the least upon either aluminum, steel, or platinum when the metals are isolated, but when a wire of aluminum coupled with a wire of platinum or a wire of steel is plunged into this acid the direction of the current produced at the moment of immersion seems to show that the steel or platinum is the metal acted upon at first, but almost instantaneously the current reverses, and the aluminum becomes the positive element of the couple. Associated with zinc or iron in the same acid, aluminum is strongly negative.

During these experiments it occurred to M. Saint Edme to compare with the electrical properties of aluminum those of the various kinds of aluminum bronze, in the hope of thereby obtaining some new light upon the question as to whether the remarkable alloys are chemical combinations of aluminum and copper, or only mechanical mixtures of the two metals. Three of these beautiful gold-colored alloys are manufactured, one containing 5 per cent; another containing 7½ per cent, and the third containing 10 per cent of aluminum. The homogeneity of these alloys, neither of which is susceptible of "liquation," as ordinary bronze and gun metal are, and the intense heat which is developed when their constituents are added to each other in the molten state, the mass suddenly rising to such a temperature that the eye cannot bear its dazzling whiteness, have led most chemists to regard them as being compounds, and not merely mixtures. M. Saint Edme comes, however, to the opposite conclusion. We cannot give this week the details of his experiments, but their results served to convince him that, alike in the three above-mentioned varieties of aluminum bronze, and in a fourth, containing 60 per cent of aluminum, which was prepared specially for his experiments, the two constituents are merely mechanically associated.—*Mechanics' Magazine.*

### Condition of the Patent Office---Suggestions about Amending the Patent Laws.

We copy the following extracts from the Report of the Secretary of the Interior:—

During the year ending September 30, 1865, there were received at the Patent Office 11,860 applications for patents, and 70 applications for an extension of patents; 6,292 patents (including reissues and designs) were issued, and 61 extensions granted; 1,538 caveats were filed; 741 applications were allowed, but no patents issued thereon by reason of the non-payment of the final fee.

On the first day of October, 1864, there was a balance to the credit of the fund of $56,117 39. The fees received for the succeeding twelve months amounted to $316,987 27. The expenditures during the same period were $262,445 47, leaving a balance on the first day of October, 1865, of $110,659 19.

The law provides that in interference cases, or where Letters Patent have been refused, an appeal lies from the decision of the primary examiner to the examiners-in-chief, and from their decision to the Commissioner of Patents. According to a judicial construction of existing laws, an appeal may be taken from the decision of the Commissioner to the chief justice, or one of the associate judges of the Supreme Court of this district. This procedure is unnecessarily circuitous and protracted, and should be abridged by an amendment of the law so as to allow an appeal from the decision of the primary examiner or the examiners-in-chief directly to the Supreme Court of the District of Columbia, if the party against whom it is rendered so elects.

The Commissioner of Patents is clothed with unrestrained discretionary power in all cases of application for the extension of patents. His decision, whether favorable or unfavorable, is final, and frequently involves private and public interests of enormous value. It is submitted for the consideration of Congress whether it is wise to lodge so large a power with a subordinate officer, without subjecting its exercise to the supervisory control of the head of the department.

### Our View of the Razor Question.

In shaving, a few days since, we lathered our face with soap and cold water, and shaved one side with the razor cold; we then made the razor as warm as we could bear it, and shaved the other side; we could not perceive any difference in the cutting of the razor in the two conditions. We have since repeated the experiment twice, with the same result. We have found, however, that when the lather is made with hot water the shaving is perceptibly easier than when cold water is used—the result being due, doubtless, to the softening of the beard by the hot lather.

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## THE FOOT LATHE.

There are two distinct kinds of work done in foot lathes—the useful and the merely ornamental. Both afford enjoyment and profit to those who practice them. The mechanic who earns his living by working ten hours a day in a workshop, does not care to go home and pursue the same calling in the evening; but he can institute an agreeable change in his life, beautify his dwelling, and cultivate his taste by the use of the lathe, and thus obtain ornaments that would cost large sums it purchased at the stores; or he may, indeed, make the lathe a source of revenue, and sell the product of his skill and ingenuity at high prices to those who admire but have not the ability to construct.

To many mechanics, even, the lathe is merely a machine for turning cylinders or disks, or executing beads, ogees, scrolls, or curves of various radii, so that, after all, the work is pretty much alike, and ceases to be attractive. This is quite a mistaken view. There are no such goods in market as those made on lathes and peculiar tools used in connection with them—by lathes with traversing mandrels, with geometric chucks, with dome chucks, and compound slide rests. There are lathes that while one could chase up a five-eight bolt in them as well as on the simple pulley and treadle machine, are also capable of executing all sorts of beautiful things—vases with bases nearly square, or exactly square, with round tops and hexagonal bodies, with gracefully curved angular sides and bases fluted vertically; boxes with curious patterns, resembling basket work; in fact, any combination of straight and curved lines cut in the sides it is possible for an ingenious man to invent. Strictly speaking these are not lathes, for in order to do the things beforementioned it is necessary to use other attachments in connection with them, so that the combination of them produces the results spoken of. There is, absolutely, an unlimited field for the genius of workmen to exert itself in designing patterns and executing work of an ornamental character.

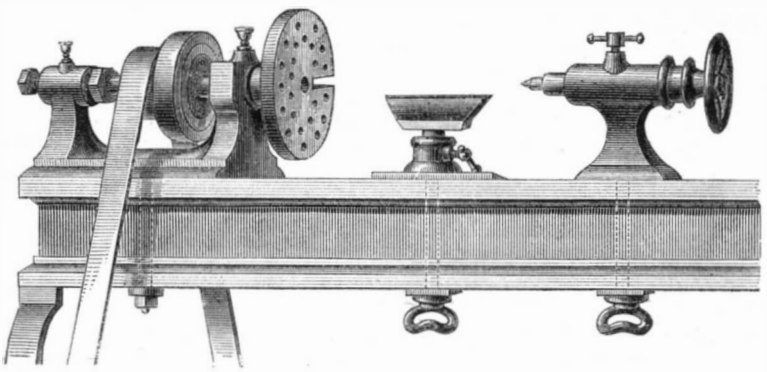
All ornamental work resolves itself into movements of three kinds—angular, circular, and straight. From the combination of these with each other, the times where they merge and emerge, where a movement of one kind changes into any other, where an ellipse becomes part of a circle, where circles are generated across the circumferences of other circles, where these patterns are drawn over and upon each other without destroying the character of either—we say, by such movements, and many others which it would be confusing to follow, the most beautiful forms are made.

Or if the taste of the workman runs upon mechanical instead of artistic things, there are steam engines to be made, steam boilers to be spun up, of small size; in fact any piece or machine that can be thought of.

It is almost unnecessary to specify the innumerable kinds of work that can be done in a hand lathe, but the amateur who delights in metal turning may make trinkets of all kinds for his friends that shall vie in beauty with the best efforts of jewelers and goldsmiths. This, of course is dependent on the material used, the taste of the workman, and his originality of conception. Pins for ladies' wear can be made of boxwood and ebony glued together in sections, of all designs, and afterwards turned in beads and moldings, or otherwise ornamented in a chuck, as will be shown hereafter. Sleeve buttons can be made of ebony and silver, ivory and silver, pearl and gold, or any combination that is desired. Chess and checker men also afford a chance to display skill. And besides these, special work of any nature is within the capacity of the machine.

There is no family in this country that would not find it economy to have a foot lathe in the house where the members have mechanical tastes—not necessarily the male members, for ladies use foot lathes in Europe with the greatest dexterity. Some of the most beautiful work ever made was by Miss Holtszapfel, a relative of the celebrated mechanist of the same name. If there are shovels to be mended, the lathe will drill the holes and turn the rivets. If the handle of the saucepan is loose, it will do the same. If scissors or knives want grinding, there is the lathe; if the casters on the sofa break down, there is the lathe; if skates need repairs, either of grinding or of any other kind, there is the lathe. In short, it ought to be as much a part of domestic economy as the sewing machine, for it takes the odd stitches in the mechanical department that save money.

Let not the inexperienced reader, who hears of a lathe for the first time, be frightened at this array of terms, or diverted from the use of it, by the recital. In its simple form, as shown at the head of this article, it is readily understood, and, after a little practice, easily managed by any one, and after the first few weeks the amateur will realize the fruits his application.



At first it had not even a continuous rotary motion, but the spindle was driven by a belt worked by a spring pole or its equivalent. The belt was rolled round the spindle, and the pole allowed to spring up; the spindle then revolved the length of the belt, or rope, for belts were not thought of, and the operation was repeated, the work being done only when the force of the spring pole revolved the spindle and the job the right way.

Foot lathes have, prior to the introduction of the engine lathe, been used on very heavy work. It is but a few years, comparatively speaking—not twenty—since cast-iron shafts, six, eight, and ten inches in diameter, were turned in such lathes. For all that we know to the contrary, many jobs, far exceeding this in size, have been thus executed.

In some shops there are still standing heavy oaken shears, made of timber twenty inches deep and four or six inches wide, faced with boiler iron, and in the racks above there are long-shanked tools with which the men of old were wont to do the work.

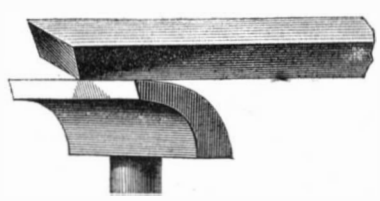


FIG. 1.

These lathes are never used now except for drilling holes, or for apprentices to practice on, but they serve to show what machinists had to do in olden times when there were no vise benches to sit on and watch the chips curling off the tool, as men do now.

Hand lathes are not in great favor in large machine shops. They are not used, or should not be, for any purpose except drilling, and then they are no longer hand lathes, but horizontal drilling machines. There is no simple work to be done on a hand lathe that could not be performed to better advantage and more cheaply on a machine constructed for the purpose.

Some large machine shops keep a hand lathe going continually cutting off stud bolts, facing and rounding up nuts and similar work. This does not seem profitable. A machine to do this work would do more of a better quality than hand labor could.

The foot lathe—the terms hand and foot lathe are synonymous—is principally used at the present time by small machinists, manufacturers of gas fixtures, amateurs, etc.; men who do not work a lathe constantly, but are called off to braze or solder, or, perhaps, to fit some detail with a file. For these uses the foot lathe is one of the cheapest tools; for the same person that does the work furnishes the power also, so that a man working on a foot or hand lathe, as it is often called, ought to have first-class wages. Moreover, a first-rate foot-lathe turner is always a good mechanic, for it takes no small degree of dexterity to perform the several jobs with ease and dispatch and certainty. To always get hold of the right tool, to use the same properly so that it will last a reasonable time without being ground or tempered, to rough turn hollow places with a square edge, to chase a true thread to the right size every time without making a drunken one, or a slanting one, to make a true thread inside of an oil cup or a box—all these several tasks require good judgment, dexterity, and a steady hand. Of course where a slide rest is used the case is different. We allude specially to a cutting tool managed by the hand.

To do all these things, however, it is necessary to have tools and good ones, or none. It is an old saying that a bad workman quarrels with his tools, but a good workman has a right to quarrel with bad tools if he is furnished with them, through chance or design. It is impossible to execute good work with a dull tool, one badly shaped, or unsuited to the purpose, and, therefore, it is important to set out right at the beginning.

There is no tool more efficient in the hands of a good workman than the diamond point, Fig. 1, here shown. For roughing off a piece of metal, for squaring up the end, for facing a piece held in the chuck, for running out a curve, or rounding up a globe, it is equally well adapted. It may be truly called the turner's friend.

[To be Continued.]

## RECENT AMERICAN PATENTS.

The following are some of the most important improvements for which Letters Patent were issued from the United States Patent Office last week; the claims may be found in the official list:—

*Steam Pump.*—This invention relates to a steam pump in which the ordinary piston pump is replaced by two plunger pumps arranged on the opposite ends of the steam cylinder, and by this means all the difficulties now experienced with the pistons of the piston pumps, and with their cylinders, is avoided, the plunger or plungers in this improved pump being so arranged that the packing can be readily tightened, and the pump can be made to operate for a long time without requiring any repairs. The steam in the steam cylinder is changed by a valve motion of peculiar construction, said motion being composed of a spring hook which slides on the surface of a double toe, which is secured to the rock shaft governing the position of the steam valve, and the ends of which rest on stair-shaped spring catches in such a manner that, by the action of the sliding spring hook, which reciprocates with the piston rod, the stair-shaped spring pawls are disengaged, and the double toe is caused to change its position, thereby changing the steam valve instantaneously whenever the steam piston approaches either end of its stroke. Felix Brown, of Nos. 57, 59, and 61 Lewis street, New York, is the inventor.

*Horse Rake.*—This invention consists in a novel construction of the teeth of the rake and springs for the same, as well as in a novel manner of mounting the rake, whereby the device may be managed or operated with the greatest facility by the driver, rendered capable of working perfectly on rough or uneven ground, and capable of being constructed at a very moderate expense. Solon Bingham, of Troy, N. Y., is the inventor.

*Machine for Bending Saw Frames.*—This invention relates to a machine for bending wooden saw frames, such as are used for saws designed for sawing fire-wood, and which frames do not form a complete semicircle, the central portion being flattened. The invention, although more especially designed for bending saw frames, is applicable for bending wood for other purposes. T. D. Roberts, Middletown, N. Y.

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## PORCELAIN PICTURES.

Next to ambrotypes, the printing of pictures on porcelain glass is one of the most rapid and easy of photographic processes. For this purpose the collodio-chloride of silver, or sensitivo collodion, first made known by Mr. Simpson, editor of the London *Photographic News*, is now extensively employed by the best artists, with splendid results. We have seen many beautiful specimens, and we use it in our own laboratory with satisfactory success.

Our photographic country readers will be enabled to produce porcelain pictures without the least difficulty by observing the following directions and formula, which we find in a recent number of our elegant cotemporary, the Philadelphia *Photographer*:—

Cleanse the porcelain glass thoroughly; beat to froth the white of one egg in an ounce of water, and let it subside; pour off carefully without filtering; flow the plate carefully with the albumen, and place at an angle to dry on blotting paper. When the plate is thoroughly dry, flow with sensitive collodion prepared as follows:—Plain collodion, 2 oz.; chloride of strontium, 3 grains; nitrate of silver, 20 grains; citric acid, 4 grains.

The last three ingredients should all be dissolved in water, using only enough to accomplish the purpose. The silver should be added, a few drops only at a time, and the whole well shaken after each addition.

The sensitive collodion must be carefully preserved in the dark or in bottles which exclude light. The flowing of the plates must also be done in the dark room. When the plates are thoroughly dry they are ready for use, and the printing is done in frames, the same as paper printing, the time required being also about the same. Print to a reddish brown color.

For toning use—water, 3 oz.; chloride of gold solution, 3 or 4 drops. Neutralize the gold with chloride of calcium, and tone to the color desired. After toning, wash the picture well under the tap, and fix in hyposulphite of soda, 2 oz. to the quart of water. The pictures should not be left in the fixing solution over five minutes. When removed, wash the same as a negative, drain and dry; then varnish.

When the pictures are to be colored, they should be done on porcelain glass the surface of which has been ground, and the albumen should be only half as strong as the formula first given.

The enterprising photographer can, by this process, take the negative, print, and deliver the porcelain picture if the light is good, within thirty minutes, it required.

## ANOTHER TRIAL IN WORKING STEAM.

An attentive correspondent forwards us two long columns of the Chicago *Tribune* devoted to an account of a new steam boiler. It is headed in large letters, "A NEW MOTIVE POWER—DANFORD'S STEAM GENERATOR—A PROBABLE REVOLUTION IN STEAM."

There is first a detailed history of the invention, in which this statement occurs:—

He looked over what authorities he could find on the subject of steam in its various conditions—particularly in regard to superheated steam. He found that while its power was recognized and defined, yet its employment was not considered either safe or economical; and, indeed, that little headway had ever been made toward its introduction as a motor.

Then comes the description of the boiler:—

Mr. Danford's boiler differs from the ordinary boiler in having no water in it—nothing but highly rarified steam, which is generated as fast as consumed by the engine. Instead of a boiler he calls it a "generator." His generator consists of a hollow cast-iron globe or large pot, 2¼ inches thick, suspended in an ordinary furnace, as a pot or kettle may be suspended over the fire. There is a casing to inclose the fire and conduct it around the generator and up the chimney, where, by the way, much caloric is usually wasted. An iron tube, made of ¾-inch gas pipe, enters the globe or generator at the top, and is conducted down to its center, where it terminates in a rose sprinkler, perforated with forty or fifty fine holes. By means of an injection pump, about a table-spoonful of water is forced into the generator at each stroke of the pump, in the form of spray. This spray does not come in contact with the sides of the generator, for before it can reach that far it is expanded into hot steam. No explosion can take place, because there is no water in the generator to explode. The water from the tube is already exploded on entering the generator; that is, it passes instantaneously from the state of spray into that of superheated steam. No farther expansion is possible. If the superheated steam should separate into its constituent gases—oxygen and hydrogen—they would produce no greater pressure nor expansion.

### REPORT OF THE ILLINOIS EXPERTS.

Recently Danford's machine was tested against a fifteen horse-power engine with locomotive flue boiler, eight-inch cylinder and fifteen-inch stroke. The same engineer attended each, and weighed the coal and measured the water. The trial lasted three days. The work done was grinding corn, and the following was the result:—

| | 15-horse engine and boiler. | Danforth's Generator and 5-horse engine. |
|---|---|---|
| Fire surface | 310 feet. | 22½ feet. |
| Pressure per inch | 40 lbs. | 110 lbs. |
| Coal consumed per hour | 101½ lbs. | 85½ lbs. |
| Water evaporated per hour | 80 gals. | 25 gals. |
| Corn ground per hour | 18 bush. | 27 bush. |

Our correspondent invites our comments on this invention, and, in return for his courtesy, let us say that spray boilers are old affairs. It was long since perceived that the disastrous effects of boiler explosions result mainly from the vast volume of steam that is formed after the boiler gives way, by the conversion—under diminished pressure—of the highly heated water into steam; and spray engines were suggested to obviate the danger.

It has also long been known that superheated steam may have any pressure at any temperature, less than that of saturated steam at the same temperature.

One of the first steam boilers used was a cast-iron pot. In the early part of the century, such a boiler was employed for propelling a small boat on a pond in this city. The manifest objection to cast iron for a boiler is, that the necessary thickness of the walls obstructs the transmission of heat from the flame to the water. A boiler which interposes a wall 2¼ inches in thickness between the fire and the water must necessarily waste nearly all the heat.

It has long been understood that the proper place for the fire is within the boiler, where it can be surrounded by water spaces. In the arrangement described the greatest possible loss would occur from radiation.

Finally, the value of statements depends entirely on the person who makes them. The results of the trial reported above are so improbable that they would hardly be accepted on the authority of Fairbairn, and when given on anonymous authority they are not worth examining. It is easy to conduct experiments so that they will apparently prove anything that may be desired; the rare and difficult thing is to conduct them with such calm and dispassionate desire to get at the facts, and with such intelligence, patience, and care, that they will prove the truth.

## PATENT-OFFICE DECISIONS.

Before the Board of Examiners-in-chief, on appeal. ELISHA FOOTE, Examiner-in-chief; S. H. HODGES and S. C. FESSENDEN.

*Sheet-metal Pails.*—The applicant devised an improvement in the mode of attaching the bottom to sheet-iron pails. His device was found to have been anticipated, and patents granted for it. He then amended his specifications and claimed the whole pail, under some supposed virtue in the phrase, "new article of manufacture," and his counsel now explains that the improvement over the cases referred to consists in galvanizing the outside.

The patent laws require that an applicant shall particularly specify and point out the part which he claims as his invention, so as to distinguish the new from the old. If the galvanizing be the novelty relied on, it should be so stated and claimed, that the Examiner may investigate and pass upon that particular point.

The decision of the Examiner is affirmed.

*Tubing Oil Wells.*—We apprehend that the Examiner has not investigated this case with reference to the principles that we think properly apply to it. As we understand it, the application is for an improved process rather than for machinery. The applicant professes to have discovered a new mode whereby the flow of oil from wells may be continued after it otherwise would cease. This he effects by shutting off all escape of gas or fluid from the well until a pressure has accumulated sufficient to force out a column of oil. Then the oil is drawn until the pressure is exhausted, when the tube is reclosed and the pressure renewed, and so on. To carry out the idea, tubes of suitable shape and size, and provided with stop-cocks, are inserted into the well and packed air tight.

The essential feature, or, as it is sometimes termed, the principle of the invention, is not the particular means adopted for the practice, but the process itself; and if that be really new, and produce valuable results, the applicant is entitled to a patent. Although the tubes, stop-cocks, and other means used, be old, their want of novelty, or, indeed, their change or variation, will not affect a patent for the real discovery.

The decision of the Examiner is reversed, with a view to a further examination of the case.

*Table Cutlery.*—The applicant has combined with a fork or other article of cutlery a sharpener, to sharpen the knife. The improvement dispenses with a separate article for that purpose, and has great convenience in use. The claim is for the combination of the sharpening device with a knife, fork, or other cutlery, substantially as described.

The Examiner rejected the claim on the ground that there was no patentable combination between a fork and sharpener—that a combination, to be patentable, must produce an effect not common to the parts separately.

We think the Examiner has been led into an error in his application to this case of a well-known principle. There are many machines that consist of combinations merely of well-known parts, and in such cases, it is true, there must be a new and useful effect produced to sustain a patent. But there is another class of devices in which the same tool or instrument is made to perform several offices, or in which several tools are combided in one, such as a cane and a gun, a saw and a square, a bureau and a bedstead, a theodolite and a compass, and such like cases, for which a great many patents have been granted; and when such combinations are the result of invention, and are new and useful, we are not aware of any objection to their patentability. If, therefore, the combination be new, we think that the applicant is entitled to the claim he has presented.

The decision of the Examiner is overruled.

*Design Patent.*—The applicant uses dark-colored furs for his groundwork and on them attaches white tufts, arranged in rows, and claims a patent for the ornamental design.

Dark grounds, with light-colored spots, arranged in almost every variety of form, is a common mode of ornamentation. It is formed on paper hangings, curtains, carpets, calicoes, cloths, silks, and almost every other article to which colors have been applied. Furs have also been ornamented by putting black spots or ermine, and arranging different colored furs in a variety of ways.

Applying a very common and well-known design to furs cannot properly be called a "new and original design," or come within the intent of the statute, which contemplates "industry, genius, efforts, and expense" as the subject of the reward. Besides, the Examiner states that "dark-colored furs ornamented with light tufts are very common, and may be seen on sale in any fur establishment." This does not appear to have been denied or a more specific reference called for.

The Examiner's decision is affirmed.

## NEW BOOKS AND PUBLICATIONS.

THE HOLIDAYS.—We have received from Messrs. L. Prang & Co., art publishers, No. 192 Washington street, Boston, some of their beautiful publications, designed for the holidays. Album pictures, in oil colors, 50 cents per set, of twelve cards. Christmas stocking library—six different stories, put up in a nice ornamented paper box. Pocket card albums—a patented article—a very neat and agreeable present. Album of Cuba, part 1, containing four views in oil, copies from original oil paintings. These albums are very beautiful, and exhibit much skill. We advise our readers who wish to purchase holiday gifts to send for Messrs. L. Prang & Co.'s circular.

AURORA FLOYD—by Miss Braddon—published by the American News Co., No. 119 Nassau street. This is a volume of 372 pages, very neatly printed, and handsomely bound; price, $1 75. Like other novels of Miss Braddon's it is well written, and very entertaining.

The American News Company publish several excellent works, and can supply at the lowest price all the chief publications in the market.

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## Notes & Queries

W. R. O., of Ohio.—There are a number of patents on gate devices, so arranged as to be operated by the passing train of cars. Perhaps your construction arrangement can be patented.

H. H. T., of N. H.—There are no works on carriage building giving all the latest styles. You should get a pattern book, if you can, from some builders.

W., of Mass.—The most generally accepted theory of the generation of electricity in the battery is, that it results from the chemical action of the liquid upon the metallic plate. Farraday ascertained that the quantity of electricity developed is just in proportion to the amount of chemical action. "Miller's Treatise on Electricity and Magnetism," republished by John Wiley, of this city, we believe is the latest good work on the subject.

W. A. B., of N. Y.—The top of an apple is the upper side or upper end.

E. W., of N. Y.—Secret processes offered for sale may always be regarded as humbugs.

R. W. M. P.—It has been suggested that glycerin would be better than alcohol to prevent the dilute acids of galvanic batteries from freezing. If you try either we should be pleased to hear the result.

D. McA., of Pa.—The chord of an arc is not the sine of any angle

H. H. F., of N.Y.—Your explanation of negative slip—that it results from the screw working in a current following the ship—has been suggested by another correspondent, and published as the most plausible of all the explanations.

J. A. G., of N. Y.—We mean to give the SCIENTIFIC AMERICAN a very wide scope in its subjects, but do not mean to include theology. Your speculations are certainly very bold and original.

H. A. B., of N. Y.—A high-pressure engine is as safe as a low pressure. Exhaust steam can be used for heating.

A. S. of Mass.—A small engine will work well with round valves, if they are properly made. A cylinder, one inch bore and four inches stroke, will require a fly wheel five inches in diameter and two pounds weight.

R. E., of Mo.—We have no facilities for getting the information you request about the brick machine.

C. C. H., of Vt.—There are different ways of ascertaining the number of revolutions in high velocities. Where gearing or belting is employed the number of revolutions of a slowly turning shaft are counted by a watch, and then the others are computed from the number of teeth in the gears, or from the diameters of the pulleys. The velocity of electricity is measured by means of a rapidly revolving mirror, and the number of its revolutions is ascertained by the note of its hum. In the uniform pitch adopted by the Congress of London, in 1860, the vibrations of A in the first octave are 440 in a second, and, of course, the vibrations of any other note are easily calculated.

W. S. H., of C. W.—Light is polarized by being reflected from a surface of glass at an angle of 56° 25′, reckoned from the perpendicular. It is also polarized by refraction, and by passing through certain crystals. "King's Notes on the Steam Engine" and "Bourne's Catechism" are both good works.

R. J. A., of N. Y.—Potassium is reduced from carbonate of potassa by charcoal at a high temperature, but the apparatus is somewhat costly and the manipulations delicate. We should not advise you to undertake the manufacture except under the instructions of a practical chemist.

C. C., of Mo.—We have never been able to understand what is meant by the "perpetual motion" for which dreamers have sought. It is certainly not a machine that will move perpetually, for that any water wheel will do. We can hardly suppose that the idea is to produce a machine that will move without any force; and yet all the known forces of nature excepting light may be made to move mechanism. We doubt whether any of the seekers of perpetual motion ever had a clear idea what it was that he was after.

### Progress of Patents since 1850.

| Year. | No. of Applications. | Patents Issued. |
|---|---|---|
| 1850 | 2,193 | 995 |
| 1851 | 2,258 | 809 |
| 1852 | 2,639 | 1,020 |
| 1853 | 2,673 | 958 |
| 1854 | 3,324 | 1,902 |
| 1855 | 4,435 | 2,024 |
| 1856 | 4,960 | 2,502 |
| 1857 | 4,771 | 2,910 |
| 1858 | 5,364 | 3,710 |
| 1859 | 6,225 | 4,538 |
| 1860 | 7,653 | 4,819 |
| 1861 | 4,643 | 3,340 |
| 1862 | 5,038 | 3,521 |
| 1863 | 5,133 | 3,780 |
| 1864 | 6,740 | 4,637 |
| 1865 | 11,860 | 6,220 |

### The Thirty-ninth Congress.

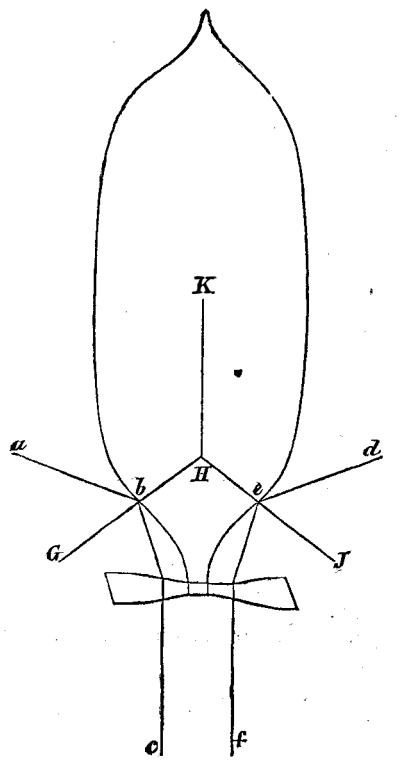
The Thirty-ninth Congress of the United States commenced its first session on the fourth day of December, 1865, that being the first Monday in the month. This being the first session of this Congress, it is not necessarily terminated on the 4th of March, but will probably extend far into the summer of 1866. The second session of this Congress will terminate on the 4th of March, 1867, at which time the terms of all the Representatives and of one-third of the Senators will expire.

## Correspondence

### Negative Slip.

MESSRS. EDITORS:—I inclose a diagram by which, perhaps, I can give you my idea of what I suppose may be the cause of the phenomenon called "negative slip."

In the diagram we are supposed to be looking down upon a horizontal section of the hull of a vessel; the section being on the line of the axis of the screw. To fill the vacuum between the screw and the vessel, formed by the action of the screw, we see two powerful currents, *a b c* and *d e f*, flowing in, one




from each side, which, in their course, strike the vessel at *b* and *e*, and exert forces in the direction of the lines, G H and J H, the resultant of which is in the direction, H K, the course of the vessel.

If this should be sufficient to account for the phenomenon, the speed of vessels propelled by screws will be found to depend more upon the distance of the screw from the vessel, and the shape of the counter, than is even now supposed to be the case.

THOS. R. LOVETT.

Philadelphia, Pa., Nov. 20, 1855.

### The Hand Lathe.

MESSRS. EDITORS:—In your number for December 2 I observe you are going to give a series of illustrated articles on the hand lathe, or, as I should call it, foot lathe, unless indeed you mean lathes worked by one hand, and the tool held by the other, or even by the foot, which is the plan I have seen employed in the Brazils. A negro sits on the floor, turns the mandrel by a bow, with the left hand, holds the tool in the right, and pushes it backward and forward with the right foot.

Call it what you will, the lathe moved by the muscle of the workman has been my hobby from my boyhood, as an amateur; and it is almost my daily friend, now, that I am not "growing old" but am already old, and I have found it a companion that seldom disputes my will, and that offers me exercise and recreation when I cannot leave the house; and, I may add, has been a solace when sorrow weighed me down, and told me to withdraw my thoughts from myself. A hand or foot lathe is an invaluable friend in any private house, where there is a gentleman of taste, and some manual dexterity. It is pre-eminently suggestive, and leads to reflection and contrivance; each day some member of your family calls its abilities into requisition, and saves a world of journeys to the carpenter and other mechanics. In the country, especially, you need your inanimate friend to get you out of trouble, and beautify your parlor, as well as your kitchen, or your farm utensils. Teach your son to love a lathe, and he will not need to leave the house for recreation. I might, add, teach your father, for I taught mine, and afterward he became a most accomplished turner, with the most intricate machinery, for eccentric, oval, dome, and all the varieties of fancy turning, in hard wood and ivory, then known in this country or in Europe. I have tried to instil the taste for the lathe into several young men, with success, and have furnished them with tools and instruction, gratuitously, and I have often wished that an amateur club of farmers could be formed, with a large workshop, to be fitted with lathes, etc., and with one or two competent mechanics to instruct them. How much more satisfactory would be an evening so spent than to resort to places of questionable amusement. In Europe, especially in England, amateur turners are to be found in great numbers, and very many of the clergymen find relaxation and exercise at their lathes. Some of the most useful and intricate tools are the inventions of amateurs. In this country there are several amateur turners, and some very superior workmen. I hope the writer of the series of articles you propose to publish has all the facilities requisite for undertaking it. If so, I need not offer the use to your draughtsman of the various tools required to be illustrated.

A few days ago, I was at the house of a friend in the country, who has the turning mania, and who has built a wing to his house for a workshop, and is fitting it up in the most complete manner. I told him, jokingly, I had a great mind to write a history of the foot lathe, and of its implements, simple and compound, for the SCIENTIFIC AMERICAN, to try to interest young men in the art of turning. His reply was, "I heartily wish you would," and I am sure when he reads your notice he will think I have taken him at his word. AMATEUR.

Astoria, Dec. 2, 1865.

[We are very much obliged to our correspondent for his interesting communication. Its publication at this time will serve to highten the interest in the series of articles we propose to publish. We assure our correspondent, also, that the writer of the series is an experienced turner, and fully competent to undertake the task.—EDS.

### The "St. John's" Boilers.

MESSRS. EDITORS:—In "Notes and Queries," page 356 of your journal, in answer to "An Old Subscriber, of New York," you say, "The notion that some great mystery is involved in boiler explosions is incorrect; they always result from imperfect workmanship or careless management. In the case of the *St. John* explosion, the sheet that gave way had been cut partly through, right along the line of fracture, by the chisel used in chipping off the overlapping sheet."

You might have added, with the same propriety, with further particulars, that the evidence of an eminent manufacturer of boilers, a rival to Messrs. Cobanks & Theall, who made the boilers of the *St. John*, exhibited the additional fact that there was no want of stays in them, all of which objections relating to the ability of the boilers to withstand the pressure—28 lbs. to the inch—at which this one gave way, would be most completely answered by stating that neither of the weaknesses noticed was of that class that would be further deteriorated by oxidation, and "but for some great mystery involved in boiler explosions," the boiler was as capable of withstanding pressure on the day of the accident as it was on the day the water test was applied but a few weeks before. The inspectors' certificate shows that 45 lbs. of water pressure was applied. I have been informed, by good authority, and believe that at that time the pressure was raised to 54 lbs. at the top of the steam chimney, which is 36 feet high from the bottom of the boiler; consequently, about 18 lbs. should be added for the weight of the column of water to show the true pressure at the bottom, which would make 64 lbs. at the point of rupture. This pressure was reduced gradually and slowly down to 40 lbs., when the blow-off valve was opened, the test concluded, and these facts established beyond question—first, that the stays were sufficient, because no permanent set was given to any part of the boiler by this excessive pressure; second, that the chisel marks you have noticed did not dangerously weaken

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the boiler, and if the iron was bad at the time of the rupture, it was so at the time of the test; third, that even the seam, one inch below the line of fracture—a weaker line to resist pressure than the chisel-mark line—also parallel with the line of fracture, was s rong enough at the time of the test. Therefore we must conclude that there was a sudden increase of pressure at the time of the accident, not shown by or noticed on the steam gage; or, the boiler was weakened after the test and previous to the rupture. Both boilers were connected together by a large steam pipe, consequently there was nearly the same pressure at all times in each. Three other places on the two boilers had the same radius of rounded surface, with the same adjustment of the stays.

It is well known that iron will receive a permanent set, with less than half the strain at which it will be ruptured; and, therefore, evidences of bending or stretching in some of the three places should be found, but cannot on the boilers now.

It was not noticed, in this case, that any part of the engine was disarranged by great pressure; neither did the engine make a few turns more rapidly than usual, and I have never heard that such evidences of over pressure have been noticed in any case of explosion. Therefore, I conclude there was a sudden or gradual weakening of the boiler—perhaps both—previous to the rupturing, and after the test was applied. The fracture occurred along the low-water line. If the sheet was at a higher temperature on one side of the line of fracture than on the other, the sheet would be weakened to resist pressure from the unequal expansion, and, it is well known, that the sheet might be broken by unequal heating without any other force acting upon it. I have applied thermometers near the places of rupture, and found a temperature below of 269°; above, of 500° On another occasion 260° below, 395° above; again 260° below and 480° above, since which the thermometer above, remaining on the boiler, has been exposed to a temperature of 630°—for the mercury boiled. If it is claimed that the thermometers were not correct, I would refer to the fact that the fitting on the steam pipe is burned to charcoal.

I am of the opinion that the result of these observations amounts to a demonstration that the boiler of the *St. John* was ruptured by the unequal expansion of the boiler iron—a theory which I claim to have discovered and proved. Knowing the cause, and the manner of its operation, it is easy to provide a remedy, which, in time, will be furnished.

Explosions of boilers that occur outside of a ship or steamboat are usually less disastrous than those where the boiler is inclosed. When the steam has to break into a cabin, it does less damage than when it has to break out; in the latter case the hot steam is restrained from expanding to some extent, and its heat is greater to scald and burn. The pressure in the same way acts on a large interior surface when the explosion is outward, while, when the boiler is on the "guards," its force is principally expended upon the open air.

I think we should endeavor to avoid charging inspectors, engineers, and mechanics with inefficiency or dishonesty as far as possible, for they are usually men who are to be respected, and whose only capital is their reputation, and rather seek for an explanation of the phenomenon which shows such accidents to be beyond their control.

NORMAN WIARD.

No. 46 Pine street, New York.

[There is nothing new in the fact that the temperature may be quite different in different parts of a steam boiler. We have seen a boiler that had, at the same instant, ice in the bottom, boiling water above, saturated steam of 282° temperature above the water, and superheated steam of considerably higher temperature in the top.—EDS.

### Scarcity of Water for a Steam Engine.

MESSRS. EDITORS:—I am getting up a steam power, but am not practically acquainted with the business. My great lack, if any, will be the want of water. I draw my water from a cistern, to supply which I have to depend upon rain. My cistern is situated at a distance of about twenty feet horizontally from the boiler and about eight feet vertically. Now I wish to inquire how you think it would work to run my escape pipe into the top of the cistern in order to condense the steam. If it will not do to run the steam into the cistern, then what form of condenser will be best, and about how much of a saving can be made in that way? H. S. A.

Kirkwood, Mo., Nov. 25, 1865.

[You cannot condense steam without sufficient water. By running the pipe into the cistern the engine would work for a time until the water became heated, when it would stop. Air condensers have been tried—that is, exposing the exhaust to a large area of surface cooled by air passed through it by a blower; but the vacuum obtained was very little. It is possible that you might save your water in this way, but we do not advise the experiment. Can you not sink a well?—EDS.

### Correction.

MESSRS. EDITORS:—When I state that a portion of my observations on the *Algonquin* and *Winooski* trials, containing an extract from the London *Engineer*—the ablest mechanical journal in England—which completely sustains my position in relation to these trials—was omitted in the publication of my communication in the last issue of your valuable journal, I think that I may rightfully complain of injustice. Particularly so as I was subjected to severe editorial criticism in comparing my view of the case to a certain experiment with salt in guano.

I decidedly object to have my claws pared, as Æsop relates happened to a love-sick lion, and then to be cudgeled. NAVAL ENGINEER.

New York City, Dec. 8, 1865.

[The article in the *Engineer*, alluded to, had been already extracted from it into our columns, and in our comments upon it we had expressed our surprise that the editor of that paper should suppose that any principle could be settled by such a series of experiments. The following is the extract which our correspondent wishes inserted.—EDS.]

"The New York trial, short as it was, has utterly demolished Mr. Isherwood's arguments, and proved to a demonstration the accuracy of the principles adopted by our most successful engineers for years past."

### To Clear a Boat of Water without Baling.

MESSRS. EDITORS:—I write you a few lines in regard to baling out boats, and if you think them worth laying before your readers, you are at liberty to do so.

If you have a boat that leaks badly, and it is in a strong current, or if you are towing it up stream, all you have to do to keep it dry is this: bore a hole through the bottom and insert a piece of tin or iron, half round, through the hole, letting it extend a few inches below the bottom of the boat, and all the water will run out without any labor. I think a ship at sea could be kept afloat if you could keep her going four miles per hour. J. S. ROLESTON.

Indiana, Pa., Nov. 19, 1865.

### The Russian-American Telegraph.

By way of California we have news of the arriva of the expedition of the Western Union Telegraph Company at Petropolowski, Russian Siberia, on the 16th of October. No accidents have happened. The parties necessary to carry out the project have gone to work vigorously. Every where they have been most cordially received, and have made thorough and extensive soundings in Norton Sound, as far north as Behring's Straits, finding no difficulties in the way. The native tribes in Northern Siberia, who, it was feared might interpose obstacles, seem anxious to assist, and express themselves gratified at the prospect of employment. The party which is to ascend the Anadyr River is probably well advanced. Colonel Bulkley left the party at Plover Bay, with a steamer, intending to visit the gulf of Anadyr. Messrs. Mahon and Bush left Nicholaski, bound also north. The work is being most vigorously prosecuted in all directions. All the parties which it was proposed to dispatch this year are already well started, and, judging of the success of the future by that of the past, it is confidently hoped greater progress will be made during the coming year.

PROF. AGASSIZ is following the upward course of the Amazon River, and has already discovered sixty new species of fish.

## REPORT OF THE SECRETARY OF THE TREASURY.

The Secretary of the Treasury, in his annual report, says that the public debt was, on the 30th of October, 1865, $2,808,549,437 55. The following is a statement of receipts and expenditures for the fiscal year ending June 30, 1865:—

| | | |
|---|---|---|
| Balance in Treasury agreeably to warrants, July 1, 1864 | | $96,739,905 73 |
| Receipts from loans applicable to expenditures | $864,863,499 17 | |
| Receipts from loans applied to payment of public debt | 607,361,241 68 | |
| | | 1,472,224,740 85 |
| Receipts from customs | 84,928,260 60 | |
| Receipts from lands | 996,553 31 | |
| Receipts from direct tax | 1,200,573 03 | |
| Receipts from internal revenue | 209,464,215 25 | |
| Receipts from miscellaneous sources | 32,978,284 47 | |
| | | 329,567,886 66 |
| Total | | $1,898,532,533 24 |
| EXPENDITURES. | | |
| Redemption of public debt | | $607,361,241 68 |
| For the civil service | $44,765,558 12 | |
| For pensions & Indians | 14,258,575 38 | |
| For War Department | 1,031,323,360 79 | |
| For Navy Department | 122,567,776 12 | |
| For int. on pub. debt | 77,397,712 00 | |
| | | $1,290,312,982 41 |
| Total | | $1,897,674,224 09 |
| Leaving a balance in the Treasury on the 1st day of July, 1865, of | | 853,809 15 |

For the year ending June 30, 1866, it is estimated that the expenditures will exceed the receipts to the extent of $112,000,000; but that in the following year the expenditures will be less than the receipts by the sum of $111,000,000. The reciepts for the year ending June 30, 1867, are estimated as follows:—

| | | |
|---|---|---|
| From customs | $100,000,000 00 | |
| From internal revenue | 275,000,000 00 | |
| From lands | 1,000,000 00 | |
| From miscellaneous | 20,000,000 00 | |
| | | $396,000,000 00 |

The expenditures, according to the estimates, will be:—

| | | |
|---|---|---|
| For the civil service | $42,165,599 47 | |
| For pensions and Indians | 17,609,640 23 | |
| For War Department | 39,017,416 18 | |
| For Navy Department | 43,982,457 50 | |
| For int. on pub. debt. | 141,542,068 50 | |
| | | 284,317,181 88 |
| Leaving a surplus of estimated receipts over estimated expenditures, of | | 111,682,818 12 |

## REPORT OF THE SECRETARY OF WAR.

In the report of the Secretary of War, a genera summary is given of the military campaigns of 1864 and 1865, ending in the suppression of armed resistance to the national authority in the insurgent States. The national military force on the 1st of May 1865, numbered 1,000,516 men. It is proposed to reduce the military establishment to a peace footing, comprehending 50,000 troops of all arms, organized so as to admit of an enlargement by filling up the ranks to 82,000, if the circumstances of the country should require an augmentation of the Army. The volunteer force has already been reduced by the discharge from service of over 800,000 troops, and the department is proceeding rapidly in the work of further reduction. The war estimates are reduced from $516,240,131 to $33,814,461, which amount, in the opinion of the Department, is adequate for a peace establishment.

## REPORT OF THE SECRETARY OF THE NAVY.

The Secretary of the Navy states in his report that at the commencement of the present year there were in commission 530 vessels, armed with 3,000 guns, and manned by 51,000 men; the number of vessels at present in commisson is 117, with 830 guns, and 12,128 men.

Since the 4th of March, 1861, 418 vessels have been purchased, of which 313 were steamers, at a cost of $18,366,681 83, and of these there have been sold 340 vessels, for which the Government has received $5,621,800 27.

The estimated expenditures for the year ending June 30, 1867, are $23,982,457.

RECEIPTS FOR MONEY.—The Commissioner of Internal Revenue has decided that all letters acknowledging the payment of any sums of money of $20 and upward must bear the two-cent revenue stamp, the same as ordinary business receipts.

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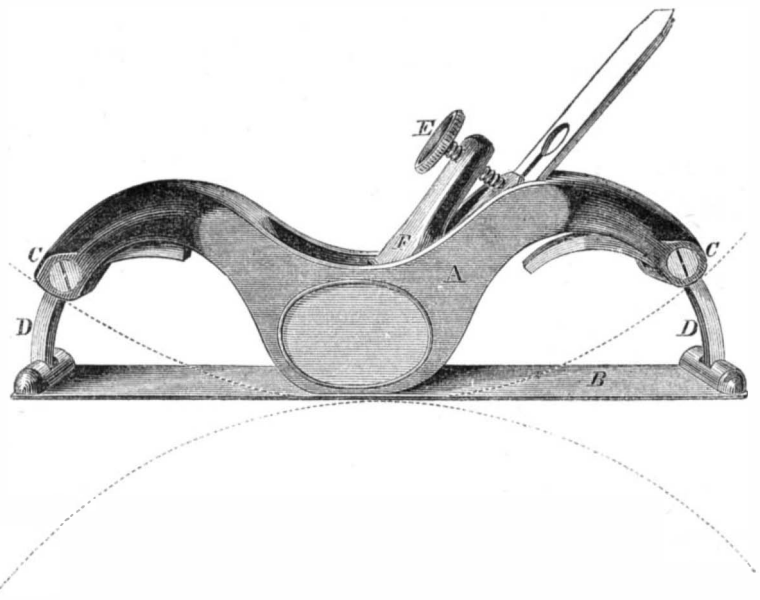
### Graduating Plane Stock.

Wood-working mechanics have long felt the want of an adjustable hand plane, adapted to finish curved surfaces with accuracy and dispatch. The number of altered wooden plane stocks, etc., fitted to special curves, lying about any large shop, testify to the prevalence of this want. Much time has been wasted in making these alterations, and in the use of such imperfect substitutes as drawing knives, spokeshaves, etc., for the purposes referred to.

The above plane is designed to fully meet the want complained of, as will be readily seen by the accompanying engraving. It consists of a peculiar hollow iron stock, A, to the bottom of which is fitted and strongly riveted a thin, highly polished steel plate, or face, B, so as to bend up or down from the center, at either end, forming a convex or concave surface, as may be required, and of any desired curve. The ends are held in their places by the set screw, C, bearing upon the shank, D, which moves easily in the opening when the screw is relaxed. The cutting iron is of the usual form, and is firmly secured by lever pressure, effected by the use of a thumb screw, E, in the upper end of the wedge, F, acting upon the cap and against a fulcrum rod—not shown in the engraving. The position of the iron may thus be instantly changed without the use of a hammer or other tool. The plane works equally well within or around a circle or upon a level surface. The same principle is also applied to the plow and rabbet plane.



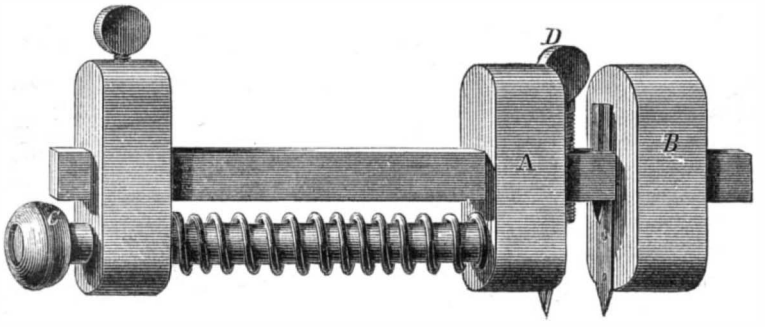

EVANS'S PATENT GRADUATING CIRCULAR PLANE STOCK.

The patent for this plane was issued through the Scientific American Patent Agency to Geo. F. Evans, of Maine, and has been assigned to R. H. Mitchell & Co., of Hudson, N. Y., by whom the planes are now manufactured, and to whom all letters may be addressed or to F. H. Webb, general agent, Hudson, N. Y.

### Improved Self-guiding Gage.

This gage is more especially intended for gunsmiths and cabinet-makers, or others using a lance gage, to divide instead of sawing thin stuff. For gunsmiths' use it is intended to make the last cut in fitting in the barrel. The stock is to be planed out in the usual way until the two side cuts are to be made which lets in the barrel. The barrel is then to be secured in place by a clamp at the muzzle, and secured at the breech pin in any convenient way so as to be steady; then, after seeing that the barrel is set so that it will be level when let in, draw the loose head containing one of the lance points far enough from the stationary head containing the other lance point to allow the barrel to be embraced by the cutters; then, by shoving the gage steadily along the barrel, the wood will be divided so as to make a good fit.

In some instances this gage is made with circular cutters or disks properly secured to the sliding heads, A. Aside from its uses as a gage for gunsmiths, it is very useful to cabinet-makers, joiners, pattern makers, and, in fact, all wood workers. For rabeting out a joint this gage is a capital guide, as it makes a deep, straight, and clean incision in the wood. The engraving explains itself. It may be well to add that there is a nut, C, on the end, which serves to adjust the sliding head, B, to minute fractional parts of an inch. The set screw, D, between the heads is for the purpose of gaging the depth to which the cutters work.




M'CRUM'S SELF-GUIDING GAGE.

It was patented through the Scientific American Patent Agency on July 11, 1865, by James McCrum; for further information address him at Locust Grove, Adams Co., Ohio.

### A Patent Sold for a Large Sum.

The sums occasionally paid for patents seem fabulous when considered in the light of ordinary commercial transactions. But they are not ordinary transactions, and that is the reason why high prices are paid for them. Men, in the early days of California, picked up large nuggets of great value lying on the surface, and realized upon them "at sight," and so, in a measure, inventors find nuggets, but not always at sight, for it often costs years of study to know just where to look for them. Mr. Joel Green, whose apparatus for deodorizing petroleum is illustrated on the first page of this number, sold the patent for $200,000, and steps are being taken to put it in operation. It has been examined by Prof. Doremus and others, and is said to be successful.

### PNEUMATIC DISPATCH.

The editor of the *Mechanics' Magazine* recently rode with eight other passengers through the portion of pneumatic dispatch tube which is completed, and he gives some facts in relation to the new mode of locomation:—

"The line just opened is a mile and three-quarters in length, and the cost is stated, at a rough calculation, to be some £30,000 or £35,000 per mile.

"The straight portions of the line are formed of a continuous cast-iron tube, the curved portions being constructed in brick work. The sharpest curve is that near the Holborn Station, which is 70 feet radius. The line passes beneath Seven Dials on a curve of 300 feet radius, and on leaving the direction of Tottenham-road court for the Euston Station a curve of 170 feet radius occurs.

"The cast-iron tube is of the horseshoe section, the internal dimensions being 4 feet 6 inches horizontally, and 4 feet vertically. The tube is cast in 9 feet lengths, each length weighing about two tuns. In the experimental lines the rails are cast on the floor of the tube, but in the present case a wrought-iron rail is used, which is bedded on longitudinal timbers. The chief gradients on the line are 1 in 40, 1 in 45, and 1 in 60, some portions of the line being on the level. The average distance between the level of rails and the road level above is 9 feet. This depth enables the tube to take a general position over the sewers and under the gas and water pipes, leaving each in the undisturbed possession of its own locality.

"The trucks, which are about 10 feet in length, resemble in form the ordinary railway open goods wagons, the ends being raised above the sides and presenting an outline conforming to that of the interior of the tube. The edges of the truck ends are bound with an elastic medium, although a slight space is left between the trucks and the face of the tube, a perfect vacuum not being indispensable to the working of the line. It is found that no inconvenience arises from leakage, while, in the case of a close fit, the results of friction would prove perjudicial. The trucks are constructed of wood cased with iron; the wheels revolve in excavated circles, and are thus flush with the sides. Each truck weighs of itself about a tun, and its load is, on an average, one tun and a half. The trains which were run on the occasion of the opening consisted of four trucks which, with their loads, represented a gross total load of 10 tuns. This weight was sent from Holborn to Euston with a blowing pressure of from 5 ounces to 6 ounces per square inch. It was afterward drawn by exhaustion from Euston to Holborn at a pressure of from about 4 to 5 ounces, the time occupied in each journey being about seven minutes. In ordinary steady working, twenty-four trains have been run in four hours, or equal to two hundred and forty tuns gross load conveyed in four hours. The cost of working is found to be less than one penny per tun per mile; this includes engine, fuel, and attendance, and all establishment charges. The low figure at which the prime cost comes out is highly favorable to the success of the undertaking in a commercial point of view.

"The machinery by which the transit of trains is effected was designed and constructed by Messrs. James Watt & Co.; it is placed in the rear of the Holborn Station, and consists of an engine having a pair of 24-inch cylinders, 20-inch stroke. A fan 22 feet in diameter is geared at two to one with the engine, and is worked continuously, the alternate action of pressure and exhaustion being governed by valves; 100 revolutions of the fan will give $3\frac{1}{4}$-inch water pressure; 200 revolutions give 13-inch. Pressures of $3\frac{3}{4}$ lbs., and even 1 lb. are quite within reach. In ordinary the fan works at 160 revolutions, equal to 6 ounces on the square inch. The machinery at Holborn is arranged for working both sections of the line, so that when the construction of the section from Holborn to the General Post-office is completed, trains will be drawn, by exhaustion, from that point and from Euston Square to Holborn simultaneously. Arrived there they will be placed each in the tube the other has just quitted, and will then be sent by pressure to their respective destinations, constant communication, if necessary, being thus maintained between Euston and St. Martin's-le-Grand. The works on the Post-office line have at present only reached as far as Ely Place, Holborn, but they are being vigorously pushed on. It is, of course, well known that the pneumatic line is constructed solely for the transmission of parcels and mail bags; nevertheless, a worse method of transit might be devised for passengers.

"The only inconvenience experienced was at the commencement and termination of the journeys, especially at the latter, when a sensation is felt in the ears very similar to that which occurs on descending in a diving bell. The time occupied in the return journey from Euston to Holborn was just eight minutes, which was rather in excess of the time taken by the train when laden with ballast only. But, in addition to the ten tuns gross load to be moved, there was now the weight of some eight or ten passengers, who thus practically illustrated their confidence in the efficiency of the system."

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THE

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NEW YORK, SATURDAY, DECEMBER 16, 1865.

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## BOILER EXPLOSIONS.

On another page we publish a communication from Mr. Norman Wiard, arguing that the explosion of the *St. John's* boiler was not the result of defective construction—though he admits the existence of the chisel cut along the line of fracture. He contends that if this cut weakened the plate it would have been shown in the hydraulic test.

We feel no disposition to criticise harshly this amiable attempt to reason away the defect in the broken plate, and to exonerate the boiler makers from all blame. The disaster must be to them a serious loss—though not so serious as to the fifteen passengers who were scalded to death by it. Mr. Wiard contends further that we ought not generally to blame engineers, inspectors, and boiler makers with inefficiency, but to look for the cause of explosions in agencies beyond human control. There is another class of reasoners who take the opposite ground, and insist that it is injurious to give an impression to engineers that they are dealing with forces beyond their power to master. Our own position is that it is best in all cases to know the exact truth.

In the history of boiler explosions these two truths stand out prominently: first, those who have investigated the subject most thoroughly are best satisfied that these disasters do not usually result from the mysterious action of uncontrollable forces, but from mechanical defects; second, when sufficient care is taken to avoid these defects, boiler explosions are entirely prevented.

No other persons have examined so many bursted boilers as the experts appointed for this purpose by the Manchester Boiler Association, and no examinations have been made with more care and fidelity. In every case, so far, those intelligent engineers have found some fatal defect in the construction of the boiler, or some impropriety in its management. Not one case yet has come under their observation in which the disaster was produced by any mysterious and uncontrollable agency.

During the long years in which the late John L. Stevens was running his steamboats on the North River, it was his practice to crawl into his boilers after every trip, to sound their plates with a hammer, and to give them a careful inspection. It was also his practice to pay his engineers twenty-five cents per day extra if they would abstain entirely from the use of ardent spirits. Mr. Stevens's boilers did not explode.

The Cunard steamers have now been running twenty-five years, rolling and driving their way through the storms of the Atlantic, and no boiler in any one of them has given way. Why not? The theorists may answer as they please—our own opinion is, that it is because they are thoroughly made and properly taken care of.

In so complicated a fabric as a modern steam boiler, where hundreds of pieces of iron are fastened together in various directions, of course any unequal expansion of the several parts from the different temperatures to which they may be exposed, should be provided for; but this provision is only one element in proper construction, and there is no element which has received more attention.

## RIMMERS.

Rimmers are indispensable tools in all shops that profess to do good work. No matter how well holes may be drilled, they are not perfect unless rimmed. The twist drills now in use in the best shops make holes as perfect as drills can, yet even with them it is necessary to run a rimmer through where two parts are to be bolted fast—as a cylinder on its frame, a pillow block in its seat, or other details that require to be immovable.

The most common form of rimmer in use is the fluted one. The cutting part consists of many blades worked out of the solid metal either by planing or milling on a machine. These tools are good in many cases, but they are frequently made with too many and too sharp cutting edges. The hole formed by such a rimmer is not round but a series of angles, as any one can see or feel by looking at it or putting a finger in. In our opinion it would be far better to make rimmers of this class with five or seven cutters than twelve or fourteen, as is generally done; and, furthermore, to leave less to rim in the work than is generally left, so that instead of taking a rank hold of the metal, the cutters would just clean the surface, and no more. In holes from half an inch to an inch, the sixty-fourth part of an inch is ample, if the drill is what it should be. In holes from an inch to two inches, a full sixty-fourth to one-thirty second should be allowed to rim out. Holes over two inches are cheaper bored out with a bar and cutter than rimmed, where it is possible, for the reason that rimming is done by hand and is slow and hard work, while boring is done by power, and is quick and easy. Rimmers with seven blades require to be well backed off, as taps are, but not so much as to cause them to jam in the hole and work hard.

We have seen rimmers made with lozenge or diamond-shaped teeth, which worked very well. A pine-apple forms a good natural illustration of their pattern. Such a rimmer is easily made in the lathe. To make it, put on screw gear to cut a quick pitch—say one turn in two inches for an inch rimmer. Cut a right-hand thread and then cut a left-hand thread on the same piece, plane it out, and back it off the same as any other rimmer. Such a tool will cut a round smooth hole and take more metal out with less labor than a straight fluted rimmer. Stubbs makes a five-sided, or pentagonal rimmer, with flat sides, that does well enough in a small work, but we never had a fancy for rimmers with flat sides. If it is necessary to straighten up a hole with a rimmer, and the tool is forced over to one side, a pentagonal rimmer is almost certain to bear in and work the hole oval.

Half-round rimmers are very useful to boiler makers or in rough work, but have no place in a machine shop.

A square rimmer is not worth a cent to do good work well. Holes, in castings that are cored out and have to be rimmed, should be drilled when over an inch, being first stopped with hard wood plugs, driven in tight, so that the drill will have a bearing on the point. Holes up to and under one inch may be cleaned out with a drift pin, which is simply a square-end punch. All rimmers, of whatever form, should enter the hole to be rimmed at least one inch before they begin to cut, so as to get a fair start and stand straight.

## EXPERIMENTS IN BURNING WATER.

We observe that our respected cotemporary, the *Mechanics' Magazine*, copies the reports which were published some time since in the daily papers of this city, of some experiments with Hagan's water-burning stove, which seemed to show an economy of about thirty-three per cent by the use of a steam jet in the fire. One of the editors of the SCIENTIFIC AMERICAN was appointed on the committee to conduct those experiments, but declined to serve, on the ground that the apparatus to be used and the plan of the experiments were such that the results would be of no value. One of the clear-headed and learned professors who did serve on the committee refused to sign the report, and assigned as the reason for this refusal that he did not believe the apparent economy to result from the introduction of the jet.

## BOILER EXPLOSIONS FROM EXPLOSIVE GASES.

From the proceedings of the Polytechnic Association, reported in another column, it will be seen that one speaker was very desirous of an explanation, why the theory that boiler explosions are caused by an explosive mixture of gases, is not sound. This theory has been strongly urged by some pretty intelligent men, and it possesses some elements of plausibility.

It is well known that water is composed of oxygen and hydrogen; that it can be decomposed by red-hot iron—the oxygen combining with the iron, and the hydrogen being set free; and that if this free hydrogen is mixed with the proper proportion of atmospheric air and set on fire, a violent explosion takes place. It was imagined that when water gets low in a steam boiler the uncovered portions of the boiler might become red hot, and the other steps in the process might successively follow. On examination, however, this theory, like all others yet propounded, is found to be unsatisfactory.

Prof. Tillman remarked at the Polytechnic that, even if hydrogen were set free in a steam boiler, there would be no air present to mingle with it, and thus to form an explosive mixture. In reply to this, the theorists would affirm that water does absorb air, and carry it into boilers, the first action of the heat being to expel this absorbed air; and the correctness of this reply must be admitted. There are, however, objections to the theory which cannot be answered.

Hydrogen and oxygen enter into chemical combination only at a high temperature. When fire is applied to a mixture of these gases, the atoms coming in contact with the fire are heated to the temperature at which combination takes place, and the heat generated in burning these raises the temperature of adjacent atoms to the point at which they combine, and thus combustion is rapidly propagated throughout the mass. If the mixture is pervaded by a sufficient proportion of steam, combustion cannot spread through the mass. It is impossible to suppose that the interior of a steam boiler is ever sufficiently free from steam to permit explosive burning of hydrogen.

If hydrogen was set free in the presence of oxygen, and at the temperature of red-hot iron, it would be burned gradually as it was liberated, instead of accumulating in quantity, and then burning explosively.

Finally, when hydrogen and oxygen are mixed in the proper proportions, and set on fire, the pressure produced is no greater than that of steam; it is, in fact, the pressure of steam. Hydrogen, in burning, combines with oxygen and forms water; which, under the action of the heat generated by the combination, exists in the form of steam.

QUARTZ CRUSHER.—Charles W. Stafford, of Saybrook, Conn., has applied for a patent through the Scientific American Patent Agency for valuable improvements in quartz crushers. The machine has been tested with excellent results thus far, and a large one is now being constructed at the Morgan Iron Works, in this city. The Empire Mining and Manufacturing Company, of this city, of which Senator Nye, of Nevada, is President, have agreed in writing to purchase the patent for $100,000, whenever a satisfactory test is made. The inventor is sanguine of perfect success.

WE are happy to state that Messrs. Crawford, Fales, and Connoly, who have hitherto acted as assistant examiners, have been promoted to principal examiners. This is an act of well-merited justice to faithful and excellent men.

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☞ Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

51,282.—Saw-mill.—S. F. Ames, Stanford, Ky.:

First, I claim wheel, D, with its movable shaft and lever, K, with wheels, a and b, in combination with wheel, E, when arranged as described to move the log carriage of a saw-mill alternately forward and backward, as described.

Second, Worm shaft, H, with its hand wheel, W, wheel, I, shaft, J, and dog, g, when combined and operating as described, to adjust or turn and hold securely a log while it is being cut radialy as described.

51,283.—Animal Trap.—Loring J. Baker, East Machias, Maine:

I claim the rocking platform, A, and its partition, B, which by its operation opens the aperature alternately to either side, as described, making a perpetual trap.

51,284.—Fire Annihilator.—Henry Baragwanath and Martin Van Wisker, New York City:

We claim subduing and extinguishing fire by means of aerated water produced and applied substantially in the manner and for the purpose herein set forth.

51,285.—Combined Fork and Sharpener.—Frederick C. Beach, Stratford, Conn.:

I claim the combination with a knife or fork or other cutlery of a sharpening device, substantially as described.

51,286.—Cultivator.—John T. Bever, Bethel, Ill.:

First, I claim the inverting triangle frame, A A A, constructed with free working joints or bolts, b b b b, or their equivalents, for the purpose of reversing the order of the turning plows, f f f f, substantially as and for the purpose set forth.

Second, I claim the double hook or clevis, d d, with cross bar or flanges, k k, or their equivalent, for the purposes herein specified.

Third, I claim the handles, c c, in combination with the inverting triangle frame, A A A, as and for the purposes herein set forth.

51,287.—Horse Rake.—Solon Bingham, Troy, N. Y.:

First, I claim the employment or use in a horse rake of wooden springs, D, formed of a series of layers, placed one over the other, in connection with teeth, E, having bars, F, attached to their upper ends, to rest or bear upon said springs, and retained thereon by a strip, G, or its equivalent, substantially as described.

Second, Mounting the rake on bars, H H, connected with springs, I I, to operate in the manner substantially as and for the purpose set forth.

51,288.—Dried Beef and Vegetable Cutter.—W. Bird and Joseph T. Bird, Flemington, N. J.:

We clasm the relative arrangement of the knife. B, springs, b b, and set screws, c c, the ends of the knife being interposed between the set screws and spring, and the whole employed in connection with the table, A, and strips, c c, in the manner and for the purposes specified

51,289.—Furnace for Converting Bars into Steel.—T. S. Blair, Pittsburgh, Pa.:

First, I claim the fire-boxes, H H H, Etc.

Second, The flues, L L L, and the flues, N N N, alternately arranged on the sides of the oven.

Third, The oven, D, heated by fire-boxes, N H, Etc., and alternate descending and ascending flues, as described, and for the purpose specified.

51,290.—Liquid Compass.—Edmund Blunt, Brooklyn, N. Y.:

First, I claim the combinaion of the needle of the compass with a central float, and with a vessel to contain a liquid, substantially as before set forth.

Second, The combination in a compass of the following instrumentalities, viz., the needle, central float, and vessel, having a spherical form internally, substantially as before set forth.

Third, The combination in a compass of the following instrumentalities, viz., the needle, central float, and vessel, a portion, at least, of which is of a lens form, substantially as before set forth.

Fourth, The combination in a compass of the following instrumentalities, viz., the needle, central float, metal vessel, and supplemental vessel of variable capacity, substantially as before set forth.

51,291.—Steam Pump.—Felix Brown, New York City:

I claim, First, A steam pump having two or more plungers arranged on the opposite ends of the steam cylinder, substantially as and for the purpose set forth.

Second, The plungers, D, being the ends of the piston rod, C, in combination with the steam cylinder, A, and pump barrels, E, constructed and operating substantially as and for the purpose described.

Third, The rocking toe, d, in combination with the spring pawls, h' h', hook-slide, e, piston rod, C, and with the steam valve of the cylinder, A, constructed and operating substantially as and for the purpose set forth.

51,292.—Cooking Stove.—Esek Bussey, Troy, N. Y.:

I claim the arrangement in a cooking stove of a culinary boiler and an exit passage for the gases of combustion, both at one end of the stove, and so that the boiler forms a part of the lateral casing on the outer side of a fire flue or fire flues in the end of the stove below the said exit passage, substantially as herein described.

51,293.—Paper Machinery.—Henry Chapman, Catawissa, Pa.:

I claim, First, The trough, C, arranged as and for the purpose described.

Second, The use of sal soda or other alkaline solution or solutions, for the purpose specified.

[The object of this invention is to prevent the adherence of the paper sheet, as it passes through and between the wet press rollers, so called, of the paper-making machines, to the upper roller of the same, and consists in combining with the said roller a trough, open along its side in contact with the roller, in which trough sal soda or other alkaline solution or solutions are placed, that, as the roller revolves, will so lubricate the roller as to prevent the adhesion of the wet paper sheet to it, as it passes through the machine—the edges of the trough in contact with the roller being packed with any suitable material, to prevent the escape of the fluid solution from it.]

51,294.—Means for Loading Hay.—Russell Cobb, Hadley, Mich.:

I claim, First, The inclined planes, C, in combination with the tackle composed of the rope, E, and pulley, D, applied to the rack, A, of a wagon, substantially as and for the purpose herein set forth.

Second, The employment and use of partitions, G, when used in connection with the rack, A, substantially as and for the purpose specified.

[This invention relates to a new and useful improvement in loading and unloading hay and grain, designed to be used in connection with a hay and grain rack. The object of the invention is to avoid the comparatively tedious operation of loading and unloading by hand, and it consists in the employment or use of removable inclined planes, and a tackle applied to the hay and grain rack.]

51,295.—Screw Propeller.—Levi H. Colborn, Chicago, Ill.:

I claim a screw blade having a central open space around its axis of revolution, substantially as and for the purpose herein specified.

I also claim arranging the face of a screw blade, having a central space around its axis of revolution, so that its outer edge in revolving shall be in advance of the radial lines extending from its inner edge, substantially as herein described and for the purpose set forth.

I also claim casting or forming each blade with its own hub, complete in itself, so that it may be attached to the propeller shaft and replaced independently to the other blade or blades, substantially as herein described.

51,296.—Weather Strips for Doors.—Giles H. Collins, Wayne, Mich.:

An auxilliary spring, K, in combination with a weather strip, A, catch, s, and sliding plate, E, all substantially in the manner and for the purpose herein set forth.

51,297.—Knife-blade Holder.—Samuel A. Cummings, Middleton, Mass.:

I claim the improved shoe knife blade holder, as made with its jaws, C C, to grasp the opposite edges of the blade and to support the said blade on its opposite sides, as specified.

51,298.—Block for Car Brakes.—Bartholomew De Vont, Harrisburg, Pa.:

I claim the form and construction of the brake block and liner, together with the form of the hanger, and the mode of securing the liner to prevent its coming off and to expedite its removal and replacement, as substantially set forth and described.

51,290.—Neck Tie.—Albert M. Dexter, Philadelphia, Pa.:

First, I claim the hook, D, in combination with a neck tie, substantially as herein described for the purpose herein set forth.

Second, The plate, C, in combination with the hook, substantially as herein described and for the purpose herein specified.

51,300.—Bolt Cutter.—Caspar Dreher, Detroit, Mich.:

I claim the bolt cutter herein described, consisting of the frame, a, cam lever, a y, guide plates, g h, cutter bar, h', adjustable cutter, s, and screw, u, all constructed, arranged, and operating, substantially as and for the purpose set forth.

[This invention relates to certain new and useful improvements in bolt cutters particularly applicable to the cutting of carriage and waggon bolts, and principally consists in a novel and peculiar arrangement of cutting knives or blades, whereby the bolts can be readily and easily cut.]

51,301.—Mowing Machine.—Henry L. Frailey, Lancaster, Pa.:

I claim the adjustable outside rod, C, in combination with the curved dividing mould board, constructed and operating in the manner and for the purpose specified.

51,302.—Pump.—Benjamin Frazee, Belleville, N. J.:

First, I claim the hollow or tubular piston, E, within the cylinder, B, and provided with a tubular piston rod, G, and having a valve, F, in its lower end opening upward, the said cylinder, B, being provided with a valve, b, at its lower end, all arranged to operate in the manner substantially as set forth.

Second, The series of grooves, a, made circumferentially in the exterior of the piston and communicating with the interior of the piston by one or more openings, b, substantially as described.

[This invention relates to a new and useful improvement in the ordinary lift pump, designed more especially for oil wells, and has for its object economy in the construction and the application of the pump to its work, and also economy in the power for operating the same.]

51,303.—Flask.—William T. Fry, Philadelphia, Pa.:

I claim the combination, substantially as described, of the screw tube, B, the screw cap, C, and its opening or openings, c, with a bottle or flask, for the purpose specified.

51,304.—Washing Machine.—A. C. Gallahue, Dover Plains, N. Y.:

I claim the fluted or corrugated roller, B, in combination with the swinging segment, C, when the latter is attached to, or suspended from, a hinged frame, D, connected with a spring, F, through the medium of a treadle, E, substantially in the manner as and for the purpose set forth.

I further claim operating the swinging segment, C, through the medium of the pendant, d, rod, e, and crank, f, on the shaft, g, at the front end of the suds box, A, substantially as described.

[This invention relates to a new and improved clothes-washing machine of that class in which a swinging pressure segment is used for producing the necessary rubbing and friction. The invention consists in a novel arrangement of a swinging pressure segment and a fluted roller, whereby clothes may be washed and thoroughly cleansed from dirt without injuring them and with but a moderate expenditure of time and labor.]

51,305.—Anchor Tripper.—Gilbert Gibson, Port Richmond, N. Y.:

I claim the combination of the grooved and bent lever, g h q, and detaining lever, p, when constructed and arranged to operate as specified.

[The object of this invention is not only to facilitate the heaving of an anchor, but to enable it to be accomplished with but little trouble, delay or labor, and consists in so forming or arranging upon the upper edge and inner side of the bulwarks of a vessel, and at or near the bow, a resting surface or support for the fluke of the anchor, that, when desired, by simply releasing or unfastening the said support the anchor will readily fall and drop by it its own weight.]

51,306.—Cultivator.—B. A. Grant, Mount Pleasant, Iowa:

First, I claim the combination and arrangement of the plow beams, J, the arms, K, the cross bar, L, vertical rods, M, and loops, m, operating as and for the purposes specified.

Second, I also claim the combination of the plow beam, I J, clasps, a, arms, K, cross bar, L, uprights, M, loops, m, uprights, P, rod, N, arms, n, all arranged and operating as and for the purposes specified.

51,307.—Framing the Stem and Dead Wood of Ships.—John Willis Griffiths, Brooklyn, N. Y.:

I claim the construction of the stems and stern posts of ships and other vessels of the same timbers, which form their respective dead woods by projecting dead woods longitudinally and diagonally beyond the wooden ends of the planking, and embedding the wooden end of the planking in a rabbet cut in the dead woods, substantially as shown and described.

51,308.—Ship Building.—John Willis Griffiths, Brooklyn, N. Y.:

First, I claim, in hull frames of wooden vessels, making the timbers and beams of the same dimensions in sidingway, substantially as shown and described.

Second, Placing the hanging knees on the sides of the timbers and beams, and in the interstices between the timbers and between the beams, substantially as shown and described.

Third, The beam supporters, E, extending from the upper clamp strake to the beam, substantially as shown and described.

Fourth, I claim the frame, consisting of the beams, knees, frame timbers, clamp strakes and beam supporters, in combination, when constructed and put together, substantially as herein described.

51,309.—Roofing Composition.—Louis Groneweg, Joseph H. Pulte, and Charles T. Jones, Cincinnati, Ohio:

We claim the roofing composition, composed and applied in the manner described, and the application of the mucilaginous mixture to harden and polish the same.

51,310.—Saw-mill.—Palmer Hamilton, Detroit, Mich.:

I claim giving to the saw in its downward mouement a rocking or rolling motion, by means of the combination of the cross head working in the curved guides at the upper end of the saw, the lower end of which is attached to a cross head working in straight guides, and pivoted to the pitman below the saw, with the crank pin, substantially as described.

51,311.—Camera Stand.—J. W. Harper, Cleveland, Ohio:

I claim the frame, H, adjustable platform, L, and segment, N, in combination with the ratchet wheel, D, and strap, J, when operating conjointly, as and for the purpose set forth.

51,312.—Scroll Saw.—Samuel Harrington, Baltimore Md.:

I claim, First, Operating the saw, S, by means of the cord, c, passing over the pulleys, o and o', in combination with the sliding rods, T, and pitmans, C, attached to crank wrists, e and e', arranged and shown as described.

Second, I claim regulating the tension of the saw and cords by means of the movable frame, m, lever, F, and segment, E, arranged to operate substantially as and for the purpose set forth.

51,313.—Washing Machine.—Giles M. Harris, Elmira, N. Y.:

I claim the combination and arrangement of the concave overhanging slat bed, B, the concave portion, K, of the bottom, at the foot of the said bed, and the convex slat rubber, C, substantially as and for the purpose herein specified.

51,314.—Valve for Steam Engines.—William M. Henderson, Baltimore, Md.:

First, I claim the arrangement of the valve, c, with the steam and exhaust poits and passages, as therein set forth.

Second, The arrangement of the passages, V V', in the valve, with the passages, X X', in the valve seat, when operating substantially as and for the purposes herein described.

51,315.—Beehive.—David Herman, Bigler, Pa.:

First, I claim the sun boxes, D2 D2, with slides, H, and gauze slides, J, in combination with the double entrance, a and b.

Second, The construction and arrangement of the boxes A A' feed box, F, and slides, d and B B, as described.

51,316.—Nut Machine.—Emil Hubner and Chas. Hall, New York City:

First, We claim the combination of the cutting devices of the nut machine, and a transferring carriage, to move the nut blank with a plunger, which moves the blank from the cutters and delivers it to the transferring carriage, constructed and arranged as set forth.

Second, The combination of the cutters and snapping and punching devices with a recessed transferring carriage, to carry the nut blank from the cutters and deliver it to the snapping and punching devices, constructed and arranged as set forth.

Third, The combination of the transferring carriage with the transferring spring nippers, the two operating substantially as set forth.

Fourth, The combination of the movable concave snapping-tool support for the flat side of the nut blank, and punch moving through said support, so that it will punch from the side opposite that at which the snapping tool operates, substantially as set forth.

Fifth, The combination of the forging mandrel with the devices for turning it, and with the former and rest therefor, substantially as described.

Sixth, The combination of the forging mandrel former and spring, substantially as set forth

Seventh, The combination of the hammer with tappets of different lengths and with an instrument to turn the nut blank upon its flat side, substantially as set forth.

Eighth, The combination of a cam ring with a movable tappet and with a movable check to clamp the tappet in its place, substantially as set forth.

51,317.—Paint.—James B. Hodgskin, New York City:

I claim as a new article of manufacture the paint made as described, by the combination of pigments with the composition hereinbefore mentioned.

51,318.—Broom Head.—Geo. W. Hoffman, Harrisburg, Pa.:

I claim the clamp, A A, composed of two symmetrical halves having clasping fingers, a' a', constructed and operating substantially as described, for the purpose set forth.

51,319.—Hair Restorative.—Michael Howard, Virginia City, Nevada.

I claim the combination of recipes, No. 1 and No. 2, substantially as stated.

51,320.—Churn.—Thomas M. Hill, Eaton, Ohio:

I claim suspending the rotary and reciprocating dashers in the churn, when combined, substantially as described.

51,321.—Fan Blower.—W. Kendrick, New York City:

First, I claim a fan blower in which the air is taken on the periphery and discharged on the periphery, the two parts being at right angles to the periphery and to each other, substantially in the manner and for the purposes set forth.

Second, As combined and arranged therewith, the case, A, with an annular cylindrical channel, c, and contraction, d, in combination with fans, e, which fit the shape of the case and fill the annular channel and the contraction, substantially as and for the purposes described

Third, Also, in combination therewith, the spider, D, adjustable on the case, A, substantially as and for the purpose set forth.

51,322.—Horse Rake.—Watson King, Springfield, Ill.:

I claim, First, The combination of the crank arms, a a, with the axle, A, wheels, B, bearings, b, thills, C, teeth, H, clearing frame, I, joint, l, and link, n, all as specified.

Second, The springs, g, and tapering loops, i, formed upon the but ends of the teeth, and employed in connection with tapering sockets, a, and keys, h, as and for the purposes set forth.

51,323.—Photographic Printing Frame for Porcelain or Glass Pictures.—W. J. Kuhns, Brooklyn, N. Y.:

I claim the slot, A A, on the side of the frame, admitting the projections, A' A', on the end of the small part of the lid, and by which the negative is securely retained in a permanent position.

51,324.—Priming Metallic Cartridges.—T. T. S. Laidley, Springfield, Mass.:

I claim the combination of an anvil, A, with the cartridge case of a primed cartridge, the said anvil, not attached to the case, receiving the percussion cap or priming on one end, the other end resting firmly against the projectile, and of such shape that when inserted it takes a central position, and cannot be blown out of the case, which has been tapered or contracted at its forward end; the whole as above described and for the purpose specified.

51,325.—Grapple Tongs for Oil Wells.—O. B. Latham, Seneca Falls, N. Y.:

I claim, First, The application of the levers, C C, to the handles, B B, and in combination therewith, in the manner and for the purposes described.

Second, Making the levers, C C, adjustable upon the handles, B B, in the manner and for the purposes described.

Third, The combination of the shank, A, with the levers, C C, and the bolt, D, passing through either of the pair of holes, o o o, for regulating the movement of the jaws, in the manner described

Fourth, The fangs, f f, constructed and applied as described, in combination with the jaws.

Fifth, The spur, E, in combination with the jaws, for the purposes, and operating as described.

51,326.—Combined Knife and Cane Stripper.—Joseph Leffel, Springfield, Ohio:

I claim the combination of a clamp and spring with the blade of

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the knife, the said clamp having an eccentric motion on the screw, and its forepart forming an angle with the back of the blade, for the uses and purposes herein described.

57,327.—Die for Forging and Shaping Pistol Frames.—Samuel P. Legg, Springfield, Mass.:

I claim the dies, constructed as herein described, and for the purpose specified.

51,328.—Bridge.—Rembrandt Lockwood, Brooklyn, N. Y.:

I claim the use and arrangement of wrought or cast-iron boxes, combined together with bands or rods of wrought iron, fastened with keys or bolts, and filling the said boxes with concrete or masonry, in the manner above described,

51,329.—Balanced Plug Valve.—Sydney Maltby, Dayton, Ohio, and Barton Pickering, Milton, Ohio:

We claim, First, the valve, C, with the attached piece, 12, the orifices, 1 2 3 and 4, the post, 5, Fig. 2, cavity 6, cavity opposite or face, 9, orifice, S, opening, 16, and face, 9, constructed substantially as described and arranged with reference to the bush, B, and its openings, for the purposes set forth.

Second, The bush or casing, B, constructed and arranged substantially as described and for the purposes specified,

Third, The rock shaft, E, constructed and arranged substantially as described, and for the purposes set forth.

Fourth, The cap, D, having an orifice arranged with reference to the bush, B, substantially as described and for the purposes specified.

Fifth, The chamber formed by the end of valve, C, the end of bush, B, and cap, D, substantially as described and for the purpose specified.

Sixth, The metallic adjusting rod, a, Fig. 3, arranged to hold a plug valve in the seat, and adjust it by the expansion and contraction of the rod to prevent the valve being damaged.

51,330.—Car Coupling.—A. S. Markham, Bushnell, Ill.:

I claim the drop hook, B, in the draw head, A, in combination with the levers, D G, connected to the hook, and also connected together relatively with each other, substantially as and for the purpose herein set forth.

[This invention relates to a new and improved car coupling, of that class which is self-coupling, and it consists in connecting with a drop hook two levers arranged in such a manner that the hook may be raised and the link or shackle liberated, either from the platform of the car or from the side of the platform, as may be most convenient.]

51,331.—Manufacture of White Rubber.—F. Marquard, Rahway, N. J.:

I claim the product obtained by the action of ammonia gas on the action of gums, such as india-rubber or gutta-percha, when said gums are treated according to the process herein described, or according to any equivalent process which will produce a like result.

I claim mixing the product obtained by the above process with phosphate of lime, substantially as and for the purpose set forth.

51,332.—Manufacture of White Rubber.—F. Marquard, Rahway, N. J.:

I claim, First, Substituting hot water for alcohol in the process of washing India-rubber or allied gums previously treated with chlorine, as and for the purpose described.

Second, Subjecting the product obtained by treating india-rubber or allied gums with chlorine, to a distilling process, either simultaneously while the same is being washed, or after the washing process is completed, substantially as and for the purpose set forth.

Third, The use of phosphate of lime in combination with the product obtained by the process above specified, for the purposes set forth.

51,333.—Carding Engine.—Harry Marsden and Thomas Howard Blamires, Huddersfield, Eng.:

We claim the combination of the doffer cylinder, B, creeper or traveling apron, C, and rollers, Q Q' Q2 and Q3, with the reciprocating or traversing carriage, by which a web of any desired thickness and length may be made, substantially as described for the purpose set forth.

Second, The combination of the creeper or traveling apron, M, with the rollers, H3 and H4, so geared to an increased motion that they be made to draw out the web while winding it, as herein set forth.

Third, The combination, with the delivery end of a scribbler, of a reciprocating or traversing carriage carrying a creeper or endless traveling apron, m, made to extend under the lap or roll of wood or other fiber, T, and wind it by friction, substantially as described.

Fourth, The combination with a carding engine of an endless traveling apron or creeper, by which a lap or roll of wood or other fiber is unrolled and fed to said engine by friction, substantially as herein described.

51,334.—Sieve for Separating Oats from Wheat.—James H. Mather, Lawrenceville, Pa.:

I claim the combination and arrangement of the lower, concave sieve, B, with the upper, plane sieve, A, substantially as and for the purpose herein specified.

51,335.—Rotary Engine.—Elisha Matterson, South Brooklyn, N. Y.:

I claim the arrangement of the shaft, C, and the wheels, E, E', with the box or cylinder, A, said cylinder being provided with one or more partitions, whereby two or more chambers are formed in which the steam from the wheels is used more than once against partially compressed steam, as and for the purpose herein specified.

51,336.—Rock Drill.—Theophilus Mayhew, New York City:

I claim imparting to the drill; D, one or more rapid revolutions by means of the racks, r r, and gearing, a a N P, when operated by the upward and downward motion of the weight, W, substantially as and for the purposes set forth.

51,337.—Blotter.—Charles C. Moore, New York City:

I claim two rounded, oval, or flat plates, A B, of any suitable material, secured together by the knob, c c, or its equivalent, substantially as herein described and for the purpose specified.

51,338.—Device for Annealing Car Wheels.—H. W. Moore, Bridgeport, Conn.:

I claim annealing the center or plate of a car wheel, so as to render it quite malleable without annealing or injuring the chill or tread of the wheel by means of an annular partition or wall interposed between the wheels, the inside of the wall having charcoal, and the outside sand or their substantial equivalents, placed therein as and for the purpose substantially as described.

51,339.—Spoke Shaver.—Silas S. Mowry and Albert G. Bates, Providence, R. I.:

We claim the use of the two turning wedge-form pieces, E E, for the purpose of holding the cutter of a spoke shaver in its stock, arranged and operating in the manner substantially as described.

51,340.—Spinning Bobbin.—Wm. Murdock, Winchenden, Mass.:

I claim the wooden tube or clamp socket, a, constructed in the manner and secured to the base of spinning bobbins, as described, so as to operate as and for the purposes herein set forth.

Second, I claim the application and use of wood bushings, to embrace the spindle, in combination with spinning bobbins, so constructed as to be susceptible of adjustment uniformly to the spinning jenny, as described.

51,341.—Making Horse Collars.—T. W Murphy, New Egypt, N. J.:

I claim the combination of the bench, a a g g, mounted upon its center upon two legs, b b, the stationary center piece, f, slides, h h, extension apparatus, m q u2 v, clamps, r, and cam levers, s t, all constructed and arranged to operate as and for the purposes specified.

51,342.—Press for Forming Metal Basins.—George Murray, Cambridge, Mass.:

I claim the combination of the reciprocating dies, d and e, piston, m, and clamp, f', all constructed and arranged substantially as described.

51,343.—Manufacture of Glass.—Henry Napier and J. J. Hollins, Elizabeth, N. J.:

We claim, First, Substituting in the manufacture of glass or vitreous substances for the carbonate of soda or potash, generally used as sources of the alkalies, nitrates of soda or potash, or of other alkalies, substantially as and for the purpose set forth.

Second, Recovering in the manufacture of glass, where nitrates are used, the nitric acid evolved during the process, by means substantially as herein described, or any other equivalent means.

[This invention consists in substituting for the carbonates of soda or potash hitherto used in what is technically known as the batch, the nitrates of soda or potash; or, in other words, in the use of such nitrates as the main source of the alkaline base, in the manufacture of glass or other vitrious substances.]

51,344.—Reflector for Lamps and Gas Burners.—John Oeding, San Francisco, Cal.:

I claim the combination of all these parts, arranged in the manner herein substantially set forth, and for the purpose described.

51,345.—Enameled Blind for Windows, Etc.—Thomas J. Olsaver and Wm. P. Elliott, Aurora, Ill.:

We claim constructing inside window blinds of framed pannels of enameled cloth, paper, or other similar material, prepared as described, or otherwise arranged and operating, substantially as specified and shown.

51,346.—Thread Tension Device for Sewing Machines.—J. L. Otis, Florence, Mass.:

I claim roughening that part of the tension wheel of sewing machines around which the thread passes, by cementing or otherwise fastening to it emery, sand, pounded glass, or any other equally sharp or gritty matter that will hold the thread in contact with it, substantially as and for the purpose described.

51,347.—Rotary Pump.—Oliver Palmer, Cincinnati, Ohio:

I claim, First, The scroll or converging inlet, B, which enters the receiving chamber, A, tangentially thereto, and in the opposite direction to, the rotation of the blades, when adapted and applied to a rotary pump, substantially as set forth.

Second, The combination of the rotary series of spiral blades, E, with the stationary series of spiral blades, C, substantially as set forth.

Third, The duplicated rotary series of right and left spiral blades, E and E', on a common drive shaft, D, and duplicated stationary series of right and left spiral blades, C C, combined and co-acting, as stated.

51,348.—Grain Dryer.—J. H. Pattee and E. S. Cleveland, Galva, Ill.:

We claim the combination of the inclined and ribbed cylinder, B F, adjusting lever, c, sliding plate, b, fan, G, hot-air chamber, H, furnace, K, and flue, I, all arranged to operate, as and for the purposes specified.

[This improvement belongs to that class of grain dryers which use a revolving cylinder, through which the grain passes. The cylinder in this invention is open at each end, and is inclosed within a heating chamber, and it is inclined so as to cause the grain to be moved through it by gravity. The dust and dirt, and other foreign matter of less size than the grain, are discharged through perforations made in the sides of the cylinder near its inner end, while the grain is discharged from the open end of the cylinder. More than one cylinder may be used in the same heating chamber, although only one cylinder is exhibited in this example.]

51,349.—Cock.—James Powell, Cincinnati, Ohio:

I claim, First, The combination of the barrel, B, the sides, D, and escutcheon, E, of the guard, in manner substantially as set forth.

Second, The arrangement of the shoulder, F, between the guard, E D, and the conical plug chamber, for the purpose stated.

Third, I claim the arrangement with the preceding of the upwardly tapering plug, C c c, chamber, B, spring, G, and nut, H, as set forth.

51,350.—Safety-valve Spring Balance.—T. S. Ray and S. E. Cleveland, Buffalo, N. Y.:

We claim, First, The combination and arrangement of an index hand, F, and plate, I, with spiral balance springs, A, screw rod, C, and screw nut, E, for the purpose of indicating the pressure of steam required to raise the safety valve, substantially as described.

Second, The combination with the balance springs, A, and screw rod, C, of an equalizing cross piece, C', for the purpose substantially as described.

Third, The arrangement of the lower cross piece with a screw shank and nut, so that any lost movement occasioned by loss of elasticity in the balance springs may be taken up without affecting the index hand, substantially as set forth.

51,351.—Locomotive Head Light.—T. S. Ray and S. E. Cleveland, Buffalo, N. Y.:

First, We claim the combination of the deflector, B, and shield, C, with a cylindrical wick tube and button of a locomotive headlight lamp, the deflector and shield being so constructed and connected to the top of the wick tube as to form an annular space between the wick tube and shield for the entrance of air, and so as to form a combination chamber around and above the top of the wick tube, substantially as described.

Second, Placing a cushion, f, on the flange or shoulder, d', and between the deflector and shield for the chimney to stand upon, substantially as set forth.

Third, The combination of the spindle bearing or box piece, I3, conical shoulder, J, formed on the spindle contiguous to the pinion and spiral seating spring, J', the spindle bearing having a conical seat formed therein, corresponding to the conical shoulder, J, and connected to the outside of the wick tube, substantially as described.

51,352.—Can for Preserving Butter.—Wm. C. Reutgen, Vicksburg, Miss.:

First, I claim a can for preserving butter, which is constructed of sheet metal, lined inside with a suitable inodorous and noncorrodible substance, substantially as described.

Second, A sheet-metal can, which is lined with wood or other substance, saturated with brine, substantially as described.

51,353.—Wood-bending Machine.—T. D. Roberts, Middletown, N. Y.:

First, I claim the combination of the grooved former, M, beveled plates, N, and grooved bed, P, constructed and operating as set forth.

Second, The employment or use of clamps, Y, constructed and arranged as shown, for the purpose of securing the wood to the periphery of the former, as described.

Third, The cam, O, attached to the former, and the head, W, attached to the follower separately, and combined for the purpose of giving the proper shape to the handle end of the wood, as set forth.

51,354.—Churn.—James J. Robinson, Clinton, Ill.:

I claim in churns making the dashers of a series of disks set in planes at right angles to the bottoms of the churns and supported on the ends of radial arms fixed on a vertical shaft within the churn, so that when the shaft is turned the faces of the disks advance against and through the contents of the churn, substantially as described.

[This invention has for its object to improve the churn by making its action in producing butter more rapid, and it consists in a novel construction of dasher, the same being composed of a series of wheels or disks coupled together from their centers in pairs, and set outward around a vertical shaft, at different hights in the churn. The disks are placed edgewise or vertically in the churn, and the revolution of the vertical shaft causes numerous eddies in the mass of milk and cream, by reason of the passage of the disks through it.]

51,355.—Machine for Cutting Threads on Bolts.—J. F. Rodgers, South Bend, Ind.:

I claim the slides, F, and dies, d, in combination with the guides, b, clutches, R, and plates, a, operating substantially as and for the purpose set forth.

Second, I claim the clutches, R, lever, L and sleeve, G, operating in combination with the slides, F, and guides, B, in the manner substantially as set forth.

Third, I claim the chuck, H, when constructed and arranged as specified, in combination with the bridge tree, P, and lever, R', as and for the purpose set forth.

51,356.—Animal Trap.—Benjamin F. Sanford, Galesburg, Ill.:

I claim the combination of bed plate, F, legs, C, spring, S, spindle, B, dog, A, in the manner and substantially as set forth in the above specification.

51,357.—Scales.—James Sangster, Buffalo, N. Y.:

I claim, First, Providing the scale beam with a double set or pair of pivots and bearings, in addition to those used for supporting the platform when said beam is used in connection or combination with a stand or base upon which it is supported, and a platform upon which the materials to be weighed are placed.

Second, I claim the double lever, H, with the stop, K, or its equivalent, and the rest or piece, L, when said lever is so constructed that one part only is brought into action while weighing heavy weights, and the whole of which is brought into action while weighing light weights.

Third, I claim the frame, R, when constructed as and for the purposes herein substantialy set forth and described.

51,358.—Gang Plow.—Marshall Sattley, Taylorsville, Ill.:

First, I claim the frame, J, in the described combination, with the axle, A, plow beams, M M, levers, L L, and uprights, g g, all constructed and operating as described.

Second, The attaching of the draught pole, W, to the frame, J, by means of the slotted plate, X, and bolts, m' m', for the purpose of admitting the lateral shifting of the pole and the setting of the plows more or less to land, as described.

51,359.—Harvester.—John F. Seiberling, Doylestown, Ohio:

First, I claim the lever, H, in combination with the dropping platform, M, substantially as described.

Second, I claim the arrangement and combination of the lever, H, guide, y, rod, h, and treadle, O, substantially as set forth.

Third, I claim arranging a lever upon the hinged cap of a harvester, in such a manner as to transmit motion to the dropping or grain platform, and at the same time allow the cap of the machine to be tilted up without cramping said lever, substantially as described.

Fourth, I claim a swinging link, for checking and modifying the motion of the cut-off, substantially as set forth.

51,360.—Friction Clutch.—H. K. Smith, Norwich, Conn. Antedated Nov. 18, 1865:

First, I claim forming the exterior of a shaft in one or more sectional pieces or parts, in combination with a conical or other suitable shaped plug placed and moving within the interior of the said shaft, the said sections and plug being so connected together, that by moving the plug either forward or backward within the shaft, the said sectional pieces are either brought to bear against or released from the gear or other device properly arranged therefrom upon the shaft, substantially as herein described and for the purposes specified.

Second, The peculiar arrangement herein described, the same consisting of the conical shaped plug or shaft, p, and sectional pieces, d d, arranged with regard to and bearing upon the same, substantially as and for the purposes specified.

51,361.—Machine for Making Paper Collars.—D. M. Smyth, New York City:

I claim the reciprocating feeding frame, with the sides thereof grooved to receive the sheet of paper, in combination with the griping fingers, substantially as described, and having a mode of operation such as described, and for the purpose specified.

And, I also claim the reciprocating feeding frame, with its griping fingers, operating substantially as herein described, in combination with the dies for embossing and cutting the collars, substantially as described.

51,362.—Instrument for Cleaning Boiler Flues.—John M. Spiegle, Philadelphia, Pa.:

I claim the within-described instrument composed of the rod, A, its series of washers, D, disks, E, of the gum elastic and the nut, a, or its equivalent, the whole being constructed and arranged substantially as and for the purpose herein set forth.

51,363.—Mute for Musical Instrument.—John F. Stratton, New York City:

I claim a mute for musical instruments, composed of a conical plug with a central pipe, extending through both heads of the plug and a certain distance beyond the same, substantially as and for the purpose described.

Also, fitting the central tube of the mute with an extension piece, substantially as and for the purpose set forth.

[This invention consists in the employment or use as a mute for musical instruments of a plug made to fit the bell of the instrument, and provided with a central tube extending through both heads of said plug, in such a manner that when the plug is applied to the bell of the instrument, the sound is deadened without throwing the instrument out of tune, and pupils are enabled to practice on the instrument without annoying their neighbors.]

51,364.—Mowing Machine.—John B. Tinker, Buffalo, N. Y.:

I claim, First, In a mowing machine having wheels so arranged that one horse walks in the standing grass when mowing, supporting and holding the finger bar at both ends by means of the extended and hinged shoes, E, in combination with so locating the finger bar and cutters that the cutters will do their work within or between the track of the two driving wheels.

Second, The combination of the carrying rollers, F, with the hinged and extended shoes, E, arranged and located substantially as herein described.

Third, The arrangement of the hand lever, M, chain wheels, L' L2, chains, L3 L4, and supporting frame posts, B3, as herein described, so that power may be conveniently applied simultaneously and equally at both ends of the cutting apparatus, for raising it to pass obstructions.

Fourth, The combination and arrangement of the spring, O, with the hand lever, M, chain wheels, L' L2, and chains, L3 L4, for the purposes and substantially as described.

51,365.—Cultivator.—James Townsend Head, of Sassafrass, Md.:

I claim the arrangement and combination of the lifting bar, G, lever, K, with the beams, F, made adjustable up and down, and also capable of being run laterally by the stirrups, substantially in the manner and for the purposes set forth.

Second, I claim the use of the hinged bar, O, carrying the shanks, P, and markers, R, the bar being provided with adjusting screws, V, and operated by the lever, S, substantially as described.

51,366.—Molders' Match Plate.—Charles Truesdale and Abner J. Sennett, Cincinnati, Ohio:

I claim the mode or manner substantially as described of obtaining two-faced match plates in mastic from the original block.

51,367.—Harness Buckle.—Salmon E. Tyler and Richard Tattershall, Beloit, Wis.:

We claim the lever, B, attached to the said round cross bar in the buckle frame, a, as shown at Fig. 1, clamping the tug or strap under the said flat cross bar in the said frame, a, arranged so as to work inside the buckle frame extending the whole length of the said frame and beyond the rear end thereof, provided with the bar or loop under which the tug or strap is passed, and attaching the breeching strap to the said loop in the rear end of said lever, B, when constructed substantially as and for the purpose herein set forth and described.

51,368.—Car Spring.—Richard Vose, New York City. Antedated Nov. 20, 1865:

I claim the combination of an india-rubber column with the interior of a spiral spring of metal, when the rubber and metal are cemented together along the entire length of the metallic coil, substantially in the manner and for the purpose herein set forth.

I claim also the use, in combination with the interior of a coiled metallic spring, of a central column of india-rubber, spirally grooved, substantially as and for the purpose herein set forth.

51,369.—Method of Treating Grain for the Manufacture of Alcohol.—W. M. Watson, Tonica, Ill.:

I claim the heating of the meal, as set forth, and mixing the same with hot water, for the purpose of dissolving the starch, as set forth and for the purpose described.

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51,370.—Apparatus for Filling Barrels.—H. A. Webber and C. Reifsnyder, Chicago, Ill.:

We claim, First, The combination of the vavle, G, float, F, and lever, L, or its equivalent, arranged and operating substantially as specified and shown.

Second, We claim, in combination with a self-closing barrel filler, operating substantially as described, the employment of an adjustable tube, C, for the purposes specified.

51,371.—Apparatus for Filling Barrels.—Henry A. Webber, and Charles Reifsnyder, Chicago, Ill.:

We claim, First, Closing the ports of the turning block, B, automatically, by the weight or pressure of the fluid, substantially as and for the purposes specified and shown.

Second, We claim, in combination with the casing, A, and turning block, B, the employment of the pin, c, catch, a, and springs, s, or its equivalent, substantially as and for the purposes specified and shown.

Third, We claim the combination of the turning block, B, constructed as shown, with the casing, A, arranged and operating substantially as shown and described,

Fourth, We claim the combination of the turning block, B, chamber, E, arm, d, catch, a, and pin, c, operating as and for the purposes specified and shown.

51,372.—Self-closing Barrel Filler.—Henry A. Webber and Charles Reifsnyder, Chicago, Ill.:

First, I claim, in combination with a device for admitting fluids into casks and other similar vessels, provided with an inlet and outlet port, substantially as herein set forth, and a valve or slide, or plug for closing the same, the employment of a float, operated by the pressure of the fluid escaping from the cask, substantially as and for the purposes specified.

Second, We claim the combination of the outlet pipe, D, the cup, E, the float, H, and lever, a, or its equivalent, arranged and operating substantially as herein shown and described.

51,373.—Railroad Switch.—William Wharton, Jr., Philadelphia, Pa.:

I claim a lever, F, for operating a switch, in combination with the lever, K, or an equivalent device, which, when held in a proper position by the switch tender, will serve to retain the said operating lever, but which, on being released, will permit the rails of the switch to be automatically restored to a position in line with those of the main truck, all substantially as described.

Second, In combination with the above, I claim the pendulous catch, H, or other equivalent locking device, for the purpose specified.

51,374.—Harvester.—William N. Whiteley, Jr., Springfield, Ohio:

First, I claim the radially serrated plates, L and I, in combination with the bolt, m, the tongue, M, and main frame, A, for the purpose of making the said tongue rigid at any angle of elevation that may be desired.

Second, In combination with the cutting apparatus and coupling arm, T, the lever, U, and counterpoise, u, as and for the purpose set forth.

Third, In combination with the drag bar, O, the adjustable pendent stud, N, substantially as and for the purpose set forth.

Fourth, In combination with the drag bar, O, and pendent stud, N, the shoe, P, and coupling arm, T, when constructed and connected substantially as described.

Fifth, In combination with the crank, k, and pitman, W, the sleeve, X, and bolt, x, substantially as set forth and described.

51,375.—Draughting Scale.—S. H. Wiley, Salisbury, N. C.:

I claim, First, The placing upon the sides of a right-angled measuring rule, two movable hands or pointers, by which hands or pointers spaces upon the rule are measured and computed, as described in specification.

Second, The application of the instrument thus produced to the copying by measurement either in exact enlarged or diminished size and proportion, draughts and pictures of all kinds.

51,376.—Rock Drill.—H. B. Williams and Joseph C. Wilson, Appleton, Wis.:

We claim, First, A perforated conical drill head, a, which is provided with serrated cutting edges, b b', substantially as described.

Second, The combination of a hollow sectional shaft, A, with a perforated central discharge drill, which is constructed of a conical form, substantially as described.

51,377.—Wool Press.—U. B. Williams, Lowell, Mich.:

I claim the arrangement and construction of the wool press herein described.

[This invention consists in a novel construction of a press, adapted more especially for wool, whereby simplicity, cheapness, effectiveness and durability are secured.]

51,378.—Means of Raising Monitor Turrets by Hydraulic Pressure.—Seth Wilmarth, Boston, Mass.:

I claim raising the turrets of iron clad or wooden vessels by means of hydraulic pressure, substantially as and for the purpose set forth.

I also claim packing the foot of the turret shaft, B, by means of the disk, C, packing ring, D, and packing, c, in combination with the hydraulic pump, E, inlet passage, f, and outlet passage, k, operating substantially as described.

51,379.—Knife for Removing Green Corn from the Cob.—Isaac Winslow, Philadelphia, Pa.:

I claim the above-described curved knife, provided with a broad flat gage, for the purpose of cutting green corn from the cob, substantially in the manner set forth.

51,380.—Guards or Fingers for Harvesters.—Aaron Wissler, Clay Township, Pa.:

I claim the construction and arrangement of the guards or fingers, B b, with teeth, e, and beveled or sharpened edge, C, substantially in the manner and for the purpose specified.

51,381.—Lifting Jack.—Alfred Woodworth, North White Creek, N. Y.:

I claim First, the employment or use of a spiral spring, E, under the bottom of the rack bar, for the purposes herein shown and described.

Second, The detent pawl, F, in combination with the rack bar, A, and spring, E, substantially as described.

Third, The combination and arrangement of the rack bar, A, lifting lever, C, locking bar or pawl, D, spring, E, detent pawl, F, and spring, H, as herein shown and described.

[This invention consists in the employment or use of a spiral spring located under the lower end of the rack bar, in a lifting jack, for the purpose of throwing the said bar up against the axle of the vehicle, after which it can be worked or forced up by the teeth of the lifting lever to the desired hight; this saves considerable time as well as manipulation of the lever; and it consists, also, in the employment or use of a detent pawl, or lever, for holding down the rack bar when the spring is depressed.]

51,382.—Device for Sinking Wells.—Edward Ashdown and George W. Galpin (assignors to themselves and Samuel B. Pierce and Pembroke Pierce), Homer, N. Y. Antedated Oct. 31, 1865:

We claim the arrangement of the tube, A, cap piece, B, rod, C, and socket, D, used in the manner and for the purpose herein set forth.

51,383.—Waxed-thread Chain-stitch Sewing Machine.—Edwin E. Bean, Abington, Mass., assignor to himself and Jacob Chickering, Andover, Mass.:

I claim actuating the needle lever of a chain-stitch wax-thread sewing machine by means of a crank pin, o, on the driving shaft, and curved slot, m, in combination with a hooked needle, 6, and cast-off, p, substantially as and for the purpose set forth.

I also claim, in a chain-stitch wax-thread sewing machine, the shaft, Q, for operating the awl, presser foot, and thread guide, above the table, in combination with a hooked needle, 6, and cast-off, p, below the table, substantially as described.

I also claim, in a chain-stitch wax-thread sewing machine, the disk, U, awl shaft, W, and connecting rod, m', above the table, in combination with a hooked needle, 6, and cast-off, p, below the table, substantially as set forth.

I also claim operating the presser foot, Y, by means of the latch, u, lifting dog, t', on the disk, U, and screw 17, substantially as described.

I also claim operating the thread guide, U, by means of the cam groove, j', in the disk, U, in combination with the crank, K', on the shaft, V, substantially as set forth.

I also claim operating the awl, presser foot, and thread guide, by means of the same shaft, substantially as and for the purpose set forth.

51,384.—Scroll Chuck.—A. F. Cushman, Hartford, Conn., assignor to the Warwick Tool Company, Middletown, Conn.:

First, I claim the head, A, having the scroll, a, on its face, in combination with the jaws, b, and cap, B, constructed and operating substantially as shown and described.

Second, The cap, B, provided with the flange, B', having the radial slots thereon in combination with the collar, C, head, A, and jaws, b, as and for the purpose set forth.

51,385.—Saw.—Hiram P. Dillingham (assignor to M. O. Waggoner and Geo. P. Roberts), Norwalk, Ohio:

I claim constructing saws in such a manner as that certain of the teeth shall operate as guards to prevent the saw from feeding too much, or clogging in the timber, substantially as described.

51,386.—Blow Pipe.—William T. Gillender (assignor to himself and Edwin Bennett), Philadelphia, Pa.:

I claim a perforated plunger, A, having a blow pipe, B, attached thereto, the same being constructed and united together so as to operate substantially as and for the purpose described.

I also claim, in combination with the subject matter of the above claim, the employment of the snap, C D, constructed and applied so as to operate substantially as and for the purpose described.

51,387.—Hand-pegging Machine.—Louis Goddu (assignor to Reuben W. Drew), Lowell, Mass.:

I claim, in hand-pegging machines for pegging boots and shoes, the application to the driving shaft of a crank, operating substantially as and for the purpose set forth.

I also claim the flexible knife, N, for cutting off the pegs separately and for holding them in the proper position for being driven, substantially as described.

I also claim depressing the awl, e, and peg driver, d, by releasing the spring, E, substantially as described.

I also claim securing the awl and peg driver to the plunger, F, to prevent them from moving independently of each other.

I also claim feeding the peg wood, J, through the peg trough, I, by means of a follower, K, actuated by a spring, L, substantially as set forth.

I also claim as an improvement in hand-pegging machines, producing the feed by means of the foot piece, l, actuated by the flattened or eccentric portion, r, of the driving shaft, B, in combination with the awl, c, operating substantially as described.

I also claim as an improvement in hand-pegging machines, the block, G, or its equivalent, in combination with the dog, D, or its equivalent, for raising the plunger, constructed and operating substantially as described.

I also claim as an improvement in hand-pegging machines, pivoting the beam, O, to the frame, A, to allow of its vibration, substantially as described.

I also claim the spring, S, operating substantially in the manner and for the purpose set forth.

51,388.—Prism Lathe.—Albert Kelsey (assignor to himself and Amos Brown), Charlestown, Mass.:

First, I claim as my invention my improved prism lathe, made substantially as hereinbefore described, viz., with its mandrels and spur heads, G I, and their centers, K, and the poppet heads, I, thereof, arranged on the face of the head or wheel, A, and in other respects in manner and so as to operate as set forth.

Second, I also claim the combination of the gage plate, M, and its clamp screw, g, and indicator, N, with the case, D, the key shaft, F, the mandrels, G, and their operating gears, E H, as described, the whole being arranged with respect to a rotary plate or wheel, D, and to operate substantially in manner and for the purpose as specified.

51,389.—Rotary Steam Engine.—George A. Lamb, Washington, D. C., assignor to himself and Samuel Surbrug:

I claim, First, the construction of the cap, B, with the grooves, F, metallic packing and set screws, D D, substantially as and for the purposes set forth.

Second, The combination of the cap, B, and adjustable end plates, G, substantially as and for the purposes set forth.

Third, The combination of the cap, B, and wheel C, constructed substantially as and for the purposes set forth.

51,390.—Machine for Preparing Peat for Fuel.—Samuel Marden, Newton, Mass., assignor to himself, Wm. H. Allen, A. P. Trott, and Cyrus Cobb, Jr.:

I claim the combination of the triturating mechanism, the follower and the molds, when arranged to operate substantially as described.

Also, the employment of the cleavers, in combination with the follower and double set of mold boxes, substantially as shown and described.

Also, the combination of the mold box or frame with the perforated sides and filling of sponge, substantially as specified.

Also, the arrangement of combination or mechanism for actuating the follower and cleavers, substantially as shown.

Also, the mechanism for imparting the reciprocating lateral movements to the mold box, substantially as set forth.

51,391.—Cartridge Retractor for Breech-loading Fire-arm.—Edwin S. Piper (assignor to himself and Josiah Howe), Springfield, Mass.:

I claim the elbow lever, i j, and spring, m, in combination with the ejector, E, spring latch, g, and vertically swinging breech block, B, constructed and operating substantially as and for the purpose described.

[The invention consists in an elbow lever which has its fulcrum on a pivot secured in the frame, and one arm of which is slotted and catches over a pin projecting from a spring slide, provided with a lip for the purpose of ejecting the empty cartridges, whenever the other arm of said elbow lever is exposed to the action of a spring latch secured to the under surface of the vertically swinging breech block, in such a manner that whenever said breech block is raised or swung open, and before it reaches its highest point, the latch engages with the elbow lever and acts on the cartridge ejector, causing the same to extract the cartridge, and, as the breech block is raised still higher, the spring latch releases the elbow lever and allows the cartridge ejector to fly back to its original position, thus offering no obstacle to the introduction of a new cartridge.]

51,392.—Steam-boiler Feeder.—C. H. Prentiss (assignor to himself and A. Van Norman), Detroit, Mich.:

I claim the valves, R, and chest, d, when arranged and connected together on each side of the chest, and operated conjointly, as set forth.

Second, I claim the combination of the oscillating chambers, E L, with the condensers, G, and valve drums, M M', when arranged and operating substantially as set forth.

Third, I claim the combination of the beam, H, pendulum, J, and connecting rod, U', in combination with the valves, R, and chambers, E L, as and for the purpose specified.

51,393.—Balanced Slide Valve.—John Rewbotham (assignor to himself and Andrew J. Desher), Philadelphia, Pa.:

I claim, First, A slide valve having an exhaust chamber open to the steam chest cover, in combination with strips adapted to each other and to the said valve and cover, substantially as and for the purpose described.

Second, The arranging of the recesses formed in the said strips, and communicating with the exhaust chamber, substantially as specified.

Third, The combination of the said strips with spring, G, constructed and applied to the said strips, substantially as set forth.

Fourth, The combination of the body of the valve, the strips, and the springs, H, or their equivalents.

51,394.—Step Ladder.—Abiel F. Saunders, Boston, Mass., assignor to Everett Smith, Boston, Mass., and Barnard T. Fellows, Malden, Mass.:

I claim the support, B, in combination with the side braces, d e, and steps, A, arranged and operating substantially as set forth.

51,395.—Steam Generator.—Stephen Wilcox, Jr. (assignor to himself and Charles Potter, Jr.), Westerly, R. I.:

First, I claim the combination and arrangement of the chambers, A and E, and the tubes, D and I, substantially as and for the purpose herein set forth.

Second, I claim the removable jacket, L, made in two or more thicknesses of the same or different materials, and arranged relatively to the chambers, A and E, and to the series of tubes connecting them, substantially in the manner and for the purposes herein set forth.

Third, I claim the within-described construction and arrangement of the parts, C G G', or their equivalents, whereby the draft is made to pass first around the middle and lower portions of the tubes, D, and then around their upper portions, and finally through to tubes in the steam chamber, as herein set forth.

Fourth, I claim the conical sides of the furnace, F, arranged as represented relatively to the tubes, D I, and adapted to extend the furnace outward, under the tubes, D, substantially as herein specified.

Fifth, I claim the arrangement of the arm, i, extending laterally from the axial line of the tube, I, above the tube wheel, A', and the extension of the lower end of the tube, I, below the tube sheet, E', substantially as herein specified, for the purpose of receiving the water at the upper end unmixed with the steam rising from the tube, D, and of delivering it at the lower end without interfering with the current rising into the tube, D.

Sixth, I claim the within described arrangement of the steam pipe, K, whereby it receives the steam from the interior of a series of tubes, B, and compels it to circulate more perfectly in contact with the latter before its exit from the boiler, substantially as herein specified.

51,396.—Mowing Machine.—Ruel W. Whitney, and F. M. Hardison, (assignors to themselves and Alner C. Stockin) South Berwick, Maine:

We claim the combination and arrangement of parts, by which the vertical movements of the knife head, and the reciprocating movements of the knife are effected, and the mechanism for operating the knife is thrown into or out of action, as circumstances may require, such parts being the cam, B, with its serpentine groove, e, the inclined lever, g, with its stud roller, f, and connecting rod, n, the rocker shaft, h, with its arms, k l, and spring, m, and the lever, g and its chain, t, the whole being arranged with respect to the wheels, platform, and rake head, and applied thereto substantially in the manner and so as to operate as hereinbefore specified.

51,397.—Manufacture of Iron and Steel.—Henry Bessemer, London, Eng. Patented in England Feb. 1, 1861:

I claim, First, The arrangement and construction of converting apparatus, substantially as and for the purposes shown.

Second, Tweers which pass into the fluid metal in a converting vessel, through the upper surface of said metal, in combination with a converting vessel mounted on axes.

Third, The employment in the conversion of molten crude or refined pig iron into steel or into malleable iron, of tweers, built up or constructed as herein described.

Fourth, Introducing one or more tweers into the converting vessel, and removing the same therefrom, through suitable openings made in said vessel, in the manner described.

Fifth, Heating the tweers in a retort or chamber previous to introducing them into a converting vessel.

Sixth, A tweers used in a converting vessel in combination with any suitable apparatus capable of conveniently varying the speed of the tweer or of instantly stopping it when desired.

Seventh, A casting ladle or receptacle for casting malleable iron or steel or other suitable material, provided with a tubular spout adapted to descend into the ingot mold, substantially as herein described.

Eighth, In the casting of ingots of malleable iron or steel, the immersion below the surface of the fluid metal of the orifice from which the metal flows into the mold.

Ninth, Moving said orifice gradually upward as the level of the metal rises in the mold.

Tenth, A converting vessel capable of rotary motion upon its own axis, in combination with a rope or any equivalent means, operated by hydraulic pressure in a cylinder, for the purpose of giving to such vessel a rotary or semi-rotary movement.

51,398.—Manufacture of Iron and Steel.—Henry Bessemer, London, Eng. Patented in England January 8, 1862:

I claim, First, In the manufacture of malleable iron and steel when forcing currents of atmospheric air through the fluid metal, the combined arrangement, substantially as herein described, whereby the steam employed for forcing such air is generated by means of the heat escaping from the reverberatory furnaces that are employed in melting the iron to be so converted.

Second, I claim the opening and closing of the passage conducting air into a converting vessel, by means of the rotary motion of such vessel acting through suitable mechanism on a valve situated in said air passage.

Third, I claim, in combination with a converting vessel, several separate tweer boxes, constructed and operating substantially as described.

Fourth, I claim the combination with a converting vessel of tweer boxes with separate compartments, constructed and operating substantially as described.

Fifth, I claim employing a pair of converting vessels, placed in such a position with reference to each other that the flame and splashes emitted therefrom shall be projected in opposite directions, substantially as and for the purposes described.

Sixth, I claim employing a pair of converting vessels so movable upon their own axes as to be capable of being placed in such relation to each other that the flame and splasher emitted therefrom shall be projected in opposite directions, and as to be also capable of being placed when desired in such positions as to discharge their contents into the same ladle.

Seventh, I claim combining with two or more converting vessels a ladle so arranged and operated, either by means of a crane or in any other convenient manner, that the contents of said vessel may be discharged into it, and, at the same time, so that the ladle shall be capable of swinging or turning on its point or points of suspension while being moved, substantially as described.

Eighth, I claim combining a converting vessel with a chimney, constructed with an open space beneath it, substantially as described, for the purpose of giving access to such converting vessel.

Ninth, I claim a converting vessel provided with a line of tayeres placed through the sides of the vessel, substantially as and for the purposes set forth.

Tenth, I claim the employment of ladles, formed with a second chamber or receptacle attached thereto, for regulating the supply of metal to the molds, substantially as described.

Eleventh, I claim combining the valves and cocks by which the apparatus is set in operation, so that the workman may conveniently move them from a given place, substantially in the manner described.

51,399.—Manufacture of Malleable Iron and Steel.—Henry Bessemer, London, Eng. Patented in England, Jan. 13, 1863:

I claim, First, The employment of a converting vessel, having a receiver formed beneath it, into which the air is forced before entering the tweers, and into which the converted metal is received when the forcing in of air ceases.

Second, Covering orifices of tweers in converting vessels so as to prevent the access of metal or other matters thereto until the blast of air is applied beneath such covering.

Third, Making the joint between the upper and lowering divisions of a converting vessel above the level of the charge of fluid metal, substantially as shown.

Fourth, Constructing the converting vessel in such a manner that the contained fluid metal when not supported by the pressure of air may descend through the tweer holes, when such vessel is provided with any suitable means for conducting the metal in a ladle or mold.

Fifth, Mounting converting vessels on wheels, so that they may be movable to or from the casting pit, substantially as described.

Sixth, Employing the upper part of one converting vessel over the lower part of another converting vessel, so as to hasten or facilitate a repetition of the converting process, substantially as set forth.

Eighth, Providing several movable bottoms containing tweers, and capable of being attached to a converting vessel, substantially as and for the purposes described.

Ninth, Setting tweers in a detached portion of a converting vessel, substantially as and for the purposes described.

Tenth, Drying or baking the detached portion of a converting vessel together with the tweers therein contained, prior to connecting said portion to the vessel.

Eleventh, Heating the movable bottom and tweers therein con-

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tained, preparatory to commencing the converting process, substantially as and for the purposes set forth.

Twelfth, Substituting a funnel or chimney of suitable material suspended from the roof, or secured in such a manner as to afford a free open space around the converting vessel in lieu of the chimneys heretofore used opposite to the mouth of each converting vessel, substantially as and for the purposes described.

Thirteenth, The combination of a converting vessel mounted on an axis, of a piston and rack placed in a vertical position for giving motion to such converting vessel, substantially as described.

Fourteenth, Conveying the blast through a tube surrounding the axis of converting vessels, in lieu of passing it through the axis, as heretofore practiced, substantially as described.

Fifteenth, Constructing tweers, the orifices of which are formed or arranged substantially in the manner represented in figures, 7 8 9 10 11 and 12, on sheet, D, of the annexed drawings.

Sixteenth, The employment of a rotary, semi-rotary or reciprocating paddle or agitator for the purpose of facilitating the mixing, carbonizing or alloying of converted with unconverted metal.

Seventeenth, Covering the surface of the metal while in the ladle substantially in the manner described, in order to lessen the escape of heat therefrom.

Eighteenth, Coating the paddle or agitator with loam or other slow conductor of heat, substantially as and for the purposes described.

Nineteenth, Connecting the ladle with the crane arm or other mechanism by which such ladle is supported by any suitable means that will enable the contents of the ladle to be weighed, substantially as and for the purposes described.

Twentieth, The mode of attaching the casting ladle to and attaching it from the crane arm or lifting apparatus, substantially as described.

### 51,400.—Manufacture of Malleable Iron and Steel.—Henry Bessemer, London, Eng. Patented in England Jan. 13, 1863:

First, I claim the employment of furnaces, having a revolving hearth or bed for heating or retaining the heat of ingots, blooms, or other masses of malleable iron or steel.

Second, Heating the whole or a portion of a boiler by means of causing the heated products of combustion from the furnace to pass or to be transmitted to the boiler through an arch or diaphragm, either solid or perforated, substantially as and for the purposes described.

### 51,401.—Manufacture of Malleable Iron and Steel.—Henry Bessemer, London, Eng. Patented in England Nov. 5, 1863:

First, I claim, in the manufacture of malleable iron and steel, the employment in the converting vessel of a portion of the charge of pig or refined iron in a solid and unmelted state, when placed to be heated and converted in the same compartment of such vessel, in combination with another portion of crude iron in a fluid state, in the manner and for the purposes described.

Second, I claim, in the manufacture of malleable iron and steel, the employment in any suitable vessel of a portion of the charge of pig or refined iron in a solid and unheated state, in comoination with another portion of crude iron in a fluid state, substantially in the manner and for the purposes described.

Third, I claim the manufacture of cast steel and cast malleable iron by mixing and combining molten carburet of iron with other iron or steel which has been refined, or partially refined, by puddling, but which has not been manufactured into finished steel, when the fusion of such refined, or partially refined, iron or steel is effected by forcing atmosperic air and other gaseous matters into the said molten carburet of iron.

Fourth, I claim heating or melting iron in the converting vessel by heat derived from the fuel employed preparatory to the commencement of the converting process for heating or drying such vessel.

Fifth, I claim the application to the heating or melting of iron in the converting vessel, either by solid or gaseous fuel, of the same apparatus which forces or conducts air or gases into such vessel, for the purpose of carrying on the converting process therein.

Sixth, I claim constructing a tweer box in such a manner that the air may, at will, be admitted to, or excluded from, one or more of the tweers, substantially as and for the purposes described.

Seventh, I claim converting iron, in a suitable vessel, by means of carrying air or other gases through suitable apertures, into such vessel, for the purpose of heating or melting the iron therein, in combination with carrying air or other gases by suitable apertures among the particles of said iron, for the purpose of effecting the conversion thereof.

Eighth, I claim combining with a converting vessel a perforated plate, either covered or not covered, with a suitable porous fabric, or its equivalent, substantially as and for the purposes specified.

Ninth, I claim the mode herein described of securing the tweers to the tweer box.

Tenth, I claim using the ring, K, of any suitable material, or its equivalent, for the purpose of defining the size of the opening or the line of fracture in that part of the converting vessel where the tweers are inserted, substantially as described.

Eleventh, I claim setting one or more tweers in a mass of ganister or other suitable material, in such manner that they may be attached to, or removed from, a converting vessel, without taking off the bottoms of such vessel, substantially as and for the purposes described.

Twelfth, I claim the employment of a partial vacuum for drying or consolidating the materials employed in setting tweers in converting vessels.

Thirteenth, I claim the mode, substantially as described, of strengthening a tweer by a central iron rod, and thus holding the parts thereof together when fractured.

Fourteenth, I claim, in the manufacture of malleable iron and steel, passing the atmospheric air to be employed in the conversion through, and in contact with, acid or alkaline solutions or hydrocarbons, prior to the passage of such air into the converting vessel.

### 51,402.—Cotton Gin.—Christopher Brakell, Lancaster, Eng.:

I claim the arrangement of the roller knife, b, with a gin roller a, and pressing knife or doctor, d, as herein described.

### 51,403.—Apparatus for Distilling Spirits and Other Liquids.—Francois Haeck, Brussels, Belgium. Patented in Belgium Jan. 5, 1864:

I claim the separator, herein described, consisting substantially of a series of chambers connected with each other by vapor passages and liquid escape pipes, and fitted with openings for the entrance and escape of vapor and liquid, so that the vapor is caused to circulate horizontally and slowly through the chambers in which the watery particles, mechanically mixed with the vapor, are permitted to deposit.

I also claim the combination of the said separatar with an evaporator and a condenser of the vapor, so that the vapor produced by the evaporator is caused to pass through the separator before condensation, substantially as set forth.

I also claim the combination of the said separator with an evaporator and concentrator, so that the vapor produced by the evaporator is caused to pass through the separator before concentration, substantially as set forth.

I also claim the combination of a single evaporator with a series of apparatus for operating upon the vapor, so that one or more of the latter may be worked intermittently while the evaporation is worked continuously, substantially as set forth.

I also claim the arrangement of a series of apparatus for operating upon the vapor of a single evaporator radially around said evaporator, substantially as set forth.

### 51,404.—Manufacture of Coloring Matter.—John Holliday, Huddersfield, Great Britain:

I claim the precipitating of the coloring matter from analine cotton violet dye, purifying as herein specified.

### 51,405.—Coal-mining Machinery.—J. G. Jones, Monmouthshire, Wales. Patented in England Feb. 1, 1864:

I claim the combination of the cylinder, d, carrying the bearings, c' c', of the shaft or axis, c, with an engine on a carriage, substantially as above described, and,

Second, The combination of the pistons with the valve by the tappet, n, and lever, o, substantially as herein described, and,

Third, The slotted end of the piston rod, b, acting on the axis, c, by a crank arm, substantially as described.

### 51,406.—Cooking Stove.—A. C. Williams (assignor to J. H. Shear and Joseph Packard), Albany, N. Y.:

I claim, First, The portable ash-pan, with sifter and bail, in combination with the box seat, into which it closely fits, and the inclined plate, D, substantially as shown and described.

Second, I claim the hot-air chamber, F, between the ash-pan and the front of the oven or its surrounding flue, formed and operating substantially as and for the purpose described.

### 51,407.—Tanning.—John E. Park, Seguin, Texas:

I claim the tanning material and extractive matter of the mesquit wood, live oak or chestnut applied to the tanning of leather, prepared in the manner described and for the purpose specified.

## REISSUES.

### 2,119.—Straw Cutter.—Warren and Andrew Gale, Chicopee Falls, Mass., assignees by mesne assignments of A. S. Macomber, Bennington, Vt. Patented Nov. 5, 1850, and extended:

We claim, First, The two flanged cylinders, D D, or their equivalent, in combination with a stationary knife, E, substantially as described, for the purpose of cutting food, rags, or other materials.

Second, Arranging the flanges on one cylinder, so that they will meet and lap past the flanges on the other cylinder, in machines so constructed that the said cylinders shall operate in combination with a stationary knife, E, substantially as described.

### 2,120.—Petroleum Burner for Cooking, Etc.—John P. Hayes, Philadelphia, Pa. Patented Sept. 26, 1865:

First, I claim causing the gasified hydro-carbon used to be discharged in a downward direction, from a generator, so that it will impinge directly against a plate or heating chamber beneath, substantially as and for the purposes described.

Second, I also claim, in combination with the subject matter of the preceding claim, the employment of any suitable strainer and diffuser, e', of the hydro-carbon, at a point between the usual supply reservoir and the heating chamber, C, or plate, e', as and for the purposes described.

### 2,121.—Brick Machine.—James Hotchkiss, Springfield, Ohio. Patented July 17, 1860:

I claim a revolving spiral wing, or wings, covering all, or nearly all, of the interior of the receptacle, substantially as herein set forth, in combination with a revolving mold wheel, for the purposes specified.

In combination with a spiral wing or wings, covering nearly or all the space of the receptacle, I also claim an additional spiral wing or wings, in the receptacle, either revolving in the same direction, or attached to an encircling shaft and revolving in the opposite direction, for the purpose herein set forth.

I also claim the combination of the perforated followers, with the covering of cloth upon the same, substantially as and for the purposes herein specified.

### 2,122.—Tea Kettle.—Ezra Ripley, Troy, N. Y. Patented January 1, 1861:

I claim the employment of an improved and more convenient article of tea-kettle cover, substantially the same as herein fully described and shown, and attached to or combined with spouted and bailed metallic hollow ware, or tea kettles, in the manner and for the purpose substantially as herein described and set forth.

### 2,123.—Machine for Splitting Leather.—J. A. Safford, Boston, Mass. Patented March 19, 1861. Antedated Nov. 19, 1860.:

I claim, in a machine for splitting leather, having the narrow bed, stationary knife, feed roll and gage roll, disposed and co-operating in such manner as to adapt the machine to splitting leather, a provision for simultaneously raising and lowering the opposite ends of the gage roll, substantially as described, to graduate the machine to the thickness of stock required.

I also claim combining with the feed roll, when held in position to yield to the inequalities of the stock, the means for simultaneously effecting the depression of its opposite ends, substantially as set forth.

## DESIGNS.

2,223.—Elbow of a Sheet-metal Pipe.—Frederick Bohsert, New York City.

2,224, 2,225.—Match Safe.—Leonidas Macneir (assignor to Isaac Townsend), Philadelphia, Pa. (Two cases).

2,226.—Base of Sheet-metal Water Vessels.—J. H. Stone, Philadelphia, Pa.

2,227.—Trade Mark.—Greenleaf L. Sweet, Leominster, Mass.

## TO OUR READERS.

PATENT CLAIMS.—Persons desiring the claim of any invention which has been patented within thirty years, can obtain a copy by addressing a note to this office, stating the name of the patentee and date of patent, when known, and inclosing $1 as fee for copying. We can also furnish a sketch of any patented machine issued since 1853, to accompany the claim, on receipt of $2. Address MUNN & CO., Patent Solicitors, No. 37 Park Row, New York.

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FOR SALE—STATE AND SHOP RIGHTS, ALSO Single Machines, of Clayton's Portable Cider Mill. Patented July 11, 1865. Address or apply WM. & L. CLAYTON, No. 8 Walnut street, West Philadelphia, Pa. 1*

METALLIC PATTERN LETTERS AND FIGURES—all sizes—to put on patterns, etc., for foundermen, machinists, and inventors. A beautiful and superior article.
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IMPORTANT TO ALL CONSUMERS OF STEAM.—Carvalho's improved Superheater will economize fuel and increase the power of steam. This invention, for which a Silver Medal was awarded at the late Fair of the American Institute, is more simple in its construction and efficient in its operation than any other device of the kind in use. It is easily attached to any boiler at present in use, and will effect a saving of from 20 to 30 per cent of the fuel. It will deliver pure, dry steam, of a moderate temperature for operating engines, or warming buildings, or highly superheated steam, when required for distilling, fumigating ships, etc. Persons interested in the use of steam are invited to call upon or address HENRY W. BULKLEY, Sole Agent,
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SHAPERS, SLIDE AND HAND LATHES, AND OTHER Machinist Tools. All kinds of Machinery made to order by
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25 2* Forty-second and Grand-street Ferry Railroad Co.

PARTNER WANTED—WITH $5,000, TO EXTEND a Machine Shop doing good business, in this city. Address S. T. R., Post-Office Box No. 773. 25 2*

PREMIUMS TO THE WHIPPLE FILE MANUFACTURING CO.'S FILES AND STEEL.—Gold Medal, two Silver Medals, and Diploma. Gold Medal, Silver Medal, and Diploma from the Mass. Charitable Mechanics Association, Boston. Silver Medal from the American Institute, New York. Read the following letter:—

AMERICAN INSTITUTE, NEW YORK, Oct. 18, 1865.

WM. P. PIERCE, Esq., President Whipple File Manufacturing Co.—Dear Sir:—I have the pleasure of handing to you, with this, the samples of Files as tested by me as one of the judges in connection with the Thirty-sixth Annual Exhibition of the American Institute. You will notice in addition to those furnished by the Whipple File Manufacturing Company, which I understand are made from steel of their own production, that two of the most celebrated English makers are represented, namely, Messrs. Greaves & Son and Messrs. Moss & Gamble, and it affords me much satisfaction to state that after having given the samples an equal and impartial test, I find those presented by the Whipple File Manufacturing Co. to be fully equal, if not superior, to the English, and, in confirmation of my opinion, I refer parties interested to accompanying samples, which are one 12-inch half round bastard by Messrs. Greaves and Sons; one 12-inch half round bastard by Messrs. Moss & Gamble; one 13-inch half round bastard by the Whipple File Manufacturing Company.
With the results of this test in view I can see no reason why we need look to England for our supply of Files, either on account of superior quality of steel or excellence in workmanship.
Very respectfully, (signed,) R. G. McDOUGALL,
Engineer and Machinist.

Boston, Nos. 31, 38, and 40 Kilby street.
New York, No. 53 Beekman street.
Philadelphia, No. 511 Commerce street.
Chicago, No. 9 Lake street.
New Orleans, La., No. 57½ Magazine street.
AGENTS.
Baltimore, M. Keith, Jr., & Son, Nos. 23 and 25 South Charles street.
Pittsburgh, Pa., Lippincott, Fry & Co., No. 6 Wood street.
Cincinnati, Donaldson & Dunbar, No. 99 Walnut street.
St. Louis, Pratt & Fox, Nos. 139 and 141 Main street.
Detroit, Mich., J. James & Son, No. 30 Woodward avenue.
Orders sent to either of above-named Houses will receive prompt attention. J. P. CROSWELL, Treasurer.
W. P. PIERCE, President. 25

TWIST DRILLS—ALL SIZES—WITH SOCKETS AND Chucks, for Holding, on hand and for sale, by
24 10* LEACH BROTHERS, No. 86 Liberty street.

THE HARRISON BOILER—A SAFE STEAM BOILER.—The attention of manufacturers and others using steam is confidently called to this Patent Steam Generator, as combining essential advantages in Absolute Safety from explosion; in cheapness of first cost and cost of repairs; in economy of fuel, facility of cleaning, and transportation, etc., not possessed by any other boiler now in use.
This Boiler is formed of a combination of cast-iron hollow spheres—each sphere eight inches external diameter, and three-eighths of an inch thick. These are connected by curved necks, and held together by wrought-iron bolts with caps at the ends.
The form is the strongest possible; its strength to resist pressure very great—unweakened by punching or riveting, which lessens the strength of wrought-iron boiler plates about forty per cent. Every boiler is tested by hydraulic pressure at 500 pounds to the square inch. It Cannot be Burst Under Any Practicable Pressure.
It is not affected by corrosion, which so soon destroys the wrought-iron boiler. More explosions are traced to this cause than any other.
It has economy in fuel equal to the very best boilers now in use, arising from the large extent and nearness of its heating surface exposed to the direct action of the fire.
It gets up steam quickly from cold water and with little fuel.
It produces very dry superheated steam, and is not liable to priming or foaming.
It is easily transported, can be erected by ordinary workmen, and is readily cleaned inside and out. It requires no special skill in its management.
Under ordinary circumstances, it is kept free from permanent deposit by merely blowing the water entirely out once a week.
Injured parts can be renewed with great facility, as they are uniform in shape. A boiler can be increased in size to any extent by simply adding to its width, and being a multiplication of a single form its strength remains the same.
It has less weight, and takes much less ground area than the ordinary boiler, without being increased in hight.
It is applicable to ocean and river steamers, and may be used as a radiator, with steam or hot water for warming buildings. It can also be used as a condenser.
They can be sold at less cost than ordinary boilers.
Harrison Boilers can be seen in use at the following places:—
Philadelphia—At S. W. Cattell's Woolen Mill, Spruce and Twenty-fifth streets (two boilers); William Sellers & Co.'s Foundery; Stephen Robbins's Rolling Mill (two boilers); Lewis Taws' Brass Foundery; Girard Flouring Mill, Ninth street; G. W. Simons, Jeweler, Sansom street; Christian Baltz, Mince-meat Factory, Kensington; James B. Rodgers, Printer, No. 54 North Sixth street; H. C. Oram & Co.'s Foundery; McKeone, Van Haagan & Co.'s Soap Manufactory; H. C. Bower's Chemical Works, Gray's Ferry Road (two boilers); the House of Refuge.
West Philadelphia—The Pennsylvania Hospital for the Insane; Murphy & Allison's Car Factory.
Frankford, Philadelphia—Richard Garsed's Cotton Mills (two boilers).
Germantown, Philadelphia—Selsor, Cook & Co.'s Tool Factory; Elias Birchall, Armat Mills.
Manayunk, Philadelphia—American Wood Paper Co.'s Mills (three boilers).
Pottsville, Pennsylvania—At G. W. Snyder's Foundery.
Schuylkill County, Pennsylvania—At the Tremont Co.'s Coal Mines (two boilers); at the Salem Coal Mines (two boilers).
Pittsburgh, Pennsylvania—Park, Brother & Co.'s Black Diamond Steel Works; Gaskill & Butler's Rolling Mill.
Camden, New Jersey—The Camden and Atlantic Railroad's Machine Shops.
Dover, New Jersey—The Irondale Mines.
Brooklyn, New York—The Fiber Disintegrating Co.'s Paper Works.
Williamsburgh, New York—Charles Pfizer & Co.'s Chemical Works (two boilers); Charles Illig's Brewery.
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Worcester, Massachusetts—The Earle Stove Company.
Hillsboro, Ohio—C. S. Bell's Mill.
Wyandotte, Michigan—Durfee's Lumber Mills (two boilers).
St. Louis, Missouri—The Carondelet Paper Works of the Fiber Disintegrating Company (two boilers).
Drawings and Specifications furnished free of charge. Address
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MORSE'S PATENT STRAIGHT LIP, GAIN TWIST, Drills, Sockets and Chucks, of any size from 1½ inch to No. 60, Stubb's Wire Gage. For sale by F. W. BACON & CO.,
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N. B.—Orders for Scuttles received. 22 3*

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Address as formerly, or E. C. TAINTER,
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CIRCULAR SAW-MILLS—SINGLE AND DOUBLE—with heavy iron and wood frames, friction feed, and improved head blocks, with Steam Engines adapted to the Mill. Drawing given to set up by. Address, for full description,
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THE MOST VALUABLE MACHINE FOR BUILDERS and Carpenters, Furniture, Carriage, Agricultural Implement, Sash and Door, Waived and Straight, Molding and Piano Manufacturers, complete for all kinds of irregular and straight work in wood, hard or soft, superior to all others, having the capacity of 20 good mechanics, called the Variety Molding and Planing Machine. We own 9 patents, covering the valuable inventions for machines with upright mandrels. Have them manufactured in one place only for the United States and Europe, viz.: at Plass Iron Works, No. 110 East Twenty-ninth street, New York. We hear there are parties manufacturing machines infringing on some one or more of our patents. We caution the public from purchasing such infringements. Our patents secure to us the machine with either iron or wooden table, through which are two upright mandrels, having cutters in each head held by a screw nut; also, combination collars, saving 75 per cent in cutters, feed table to plane and cut, irons outside the cutters, preventing wood from taking undue hold Also guards acting as plane stocks, making it safe for a boy to run.
Agents solicited. Please send for circular giving full description.
Information or orders for machine may be addressed COMBINATION MOLDING AND PLANING MACHINE COMPANY, New York City. 23 13*

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WATER WHEELS—Rider's Patent Turbine—with valuable improvements—the best in use for general manufacturing purposes.
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Warranted superior to any in use. Send for Circulars.
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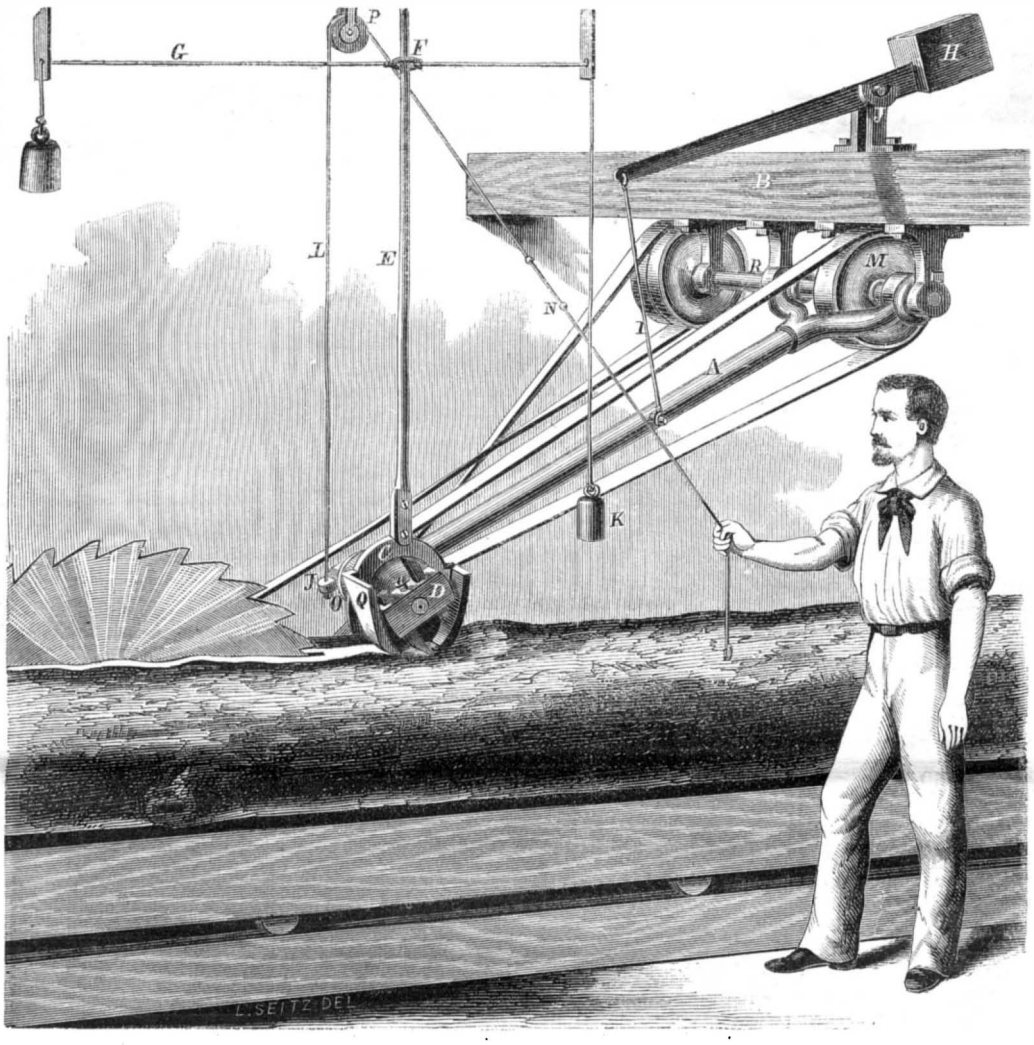
### Improved Rossing Machine.

This machine is intended to cut the bark off from logs that are to be sawed, and thereby remove much that tends to dull the saw by cutting in foreign matters, that destroy the edges in a short time. The machine consists of an arm, A, fastened to the bearings, B, so that it swings freely thereon. At the other extremity of the same arm is a disk, C, carrying pulley, not shown, and a revolving cutter head, D. These cutters are driven by a belt, E, from the shaft before mentioned, at a high velocity. The disk, C, has an upright rod, F, attached, by which the action of the shields, G, is controlled, they being inclined on one side or the other as the rod, F, is diverged from a straight line. These shields guide the cutters, as will be explained hereafter. The arm, A, is counterbalanced by a weight, H, so that it is easily raised, by drawing on the line, I, one end of which is attached to a lug, J, on the arm, and the other passes over pulleys, to the workman's hand, as shown.

The shields, G, being stationary, raise the cutters while in action, to suit any rough places or knots that may be on the logs by them; therefore, knots or crooked places are as easily managed as a straight plank.

This machine is one of great utility to sawyers, as the wear and tear of saws, labor of filing and setting them is much reduced.

This machine was patented Feb. 7, 1860, by E. H. Stearns, of Erie, Pa.; for further information address him at that place.




STEARNS'S ROSSING MACHINE.

### Silk-bearing Sheep.

One of the most interesting results of the acclimation of the merinos in France is the creation of a new and perfectly fixed race, remarkable for its silky wool, called the Mauchamp race. In 1828, there was accidentally produced at Mauchamp's farm, culitvated by M. Graux, a ram badly and even monstrously formed, having a head of unusual size and a tail of great length, but having a wool remarkable for its softness, and above all for its luster, which resembled that of silk. This was the second animal of the kind which had been born in the flock of merinos at Mauchamp; the first had been killed by the mother. M. Graux separated it from the flock, and raised it apart, to prevent any accident, and use it for reproduction; obtaining some animals similar to the sire, and others to the dam. Taking afterward the animals similar to the sire, and crossing them among themselves or with the sire, which served as a type, he succeeded in forming, little by little, a small flock of animals whose wool was perfectly silky. When he had arrived at this result, he occupied himself in modifying the forms, which he easily accomplished; and finally, in modifying the size, originally quite small, but which is now the same as that of ordinary French merinos—rams of three years old weighing as much as eighty kilogrammes, and a flock of six hundred head producing on an average two kilogrammes of wool washed on the back. As with all innovators, M. Graux met on all sides detractors of his discovery. The farmers pretended that the silky type could not be preserved when transported from Mauchamp; and the manufacturers asserted that the wool was so pliant and slippery that nothing could be done with it. They even complained of the very qualities which distinguish it. It is probable that the discoverer would have renounced the development of this magnificent race, if he had not been encouraged by an annual subvention from the government, obtained by M. Yvart, the Inspector General of the imperial sheepfolds. In 1853, M. Davin, a manufacturer distinguished for his zeal and skill in introducing new material to the textile arts, experimented upon the material rejected by others. He succeeded in making magnificent stuffs which excited the admiration of all connoisseurs. They exhibited, in the tender colors especially, reflections of light which had never been before observed, and a softness which had never been found in any material of wool of any degree of fineness. The silky luster was so marked, that, in a *challis* made with a silken warp and weft of Mauchamp wool, although the stuff contained only one-eighth of silk and seven-eighths of silky wool, it was as brilliant as if made entirely of silk. Merinos, mousselines, satins of China, and shawls, made of this material, equalled, if they did not surpass, analogous products made of the finest Cashmere yarns. The commission of savans, who reported upon the qualities of this new race to the Imperial Society of Acclamatation, say:—

"The silky wool is destined to replace completely in our industry the Cashmere which comes from Thibet. It is fully as brilliant as Cashmere, fully as soft; and, while it costs less as a raw material, it requires less manipulution to be transformed into yarn, since it does not contain the hair (*iarre*), which must be removed from the Cashmere." In 1857, a medal of the first class was decreed to M. Davin for his industrial application of this material; and the society above referred to has proposed a prize of 2,000 francs for a flock of one hundred animals of the silky type. —*Bulletin de la Societe Imperiale Zoologique d'Acclimation.*

### Modification of the Lenoir Gas Engine.

A very valuable improvement in the Lenoir gas engine has been effected by M. Hugon, of Paris. Hitherto the explosion of the mixture of coal gas and air employed in these engines has been effected by means of a volatic spark, but M. Hugon effects it by a contrivance which is at once somewhat cheaper and much more regular in its working. To the slide or other valves regulating the admission of gas and air into the cylinder he attaches little burners, supplied with gas under pressure, and he so arranges that the flame from these burners shall explode the mixture in the cylinder at the proper time. These little jets are blown out by the explosion, but are afterward relighted by an outer jet, which is kept constantly burning. This simple improvement seems likely to considerably diminish the uncertainty and irregularity which have hitherto characterized the action of the gas engine.

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The time for filing applications from the United States having been extended, it will be the endeavor of the agent at New York Mr. J. C. Derby, No. 5, Spruce street) to make the representation of the art and industry of the United States as complete as possible; it will, therefore, be necessary for him to make selections of representative articles in every class, or group, rather than accept many specimens of the same class, whatever may be their merits. The necessity for this arises from the limited space assigned to the United States, namely, thirty thousand square feet, which is equivalent to an area of one hundred and fifty feet by two hundred. This, however, is five or six times as much as we have been assigned in previous exhibitions.

In order to secure for representation that universality of character above indicated, it would be advisable for those classes of manufacturers, artisans, and others who produce articles of very general consumption, to adopt some concerted action, and delegate intelligent persons to correspond for them with Mr. Derby. Reference should be made to the list of classes and groups to be found in the official pamphlet, a revised and enlarged edition of which Mr. Derby is now distributing. It should be borne in mind that, although the applications must be in Mr. Derby's hands before the 1st of January next (and as much earlier as possible is desirable), the exhibitors will have over a year in which to prepare their specimens.

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